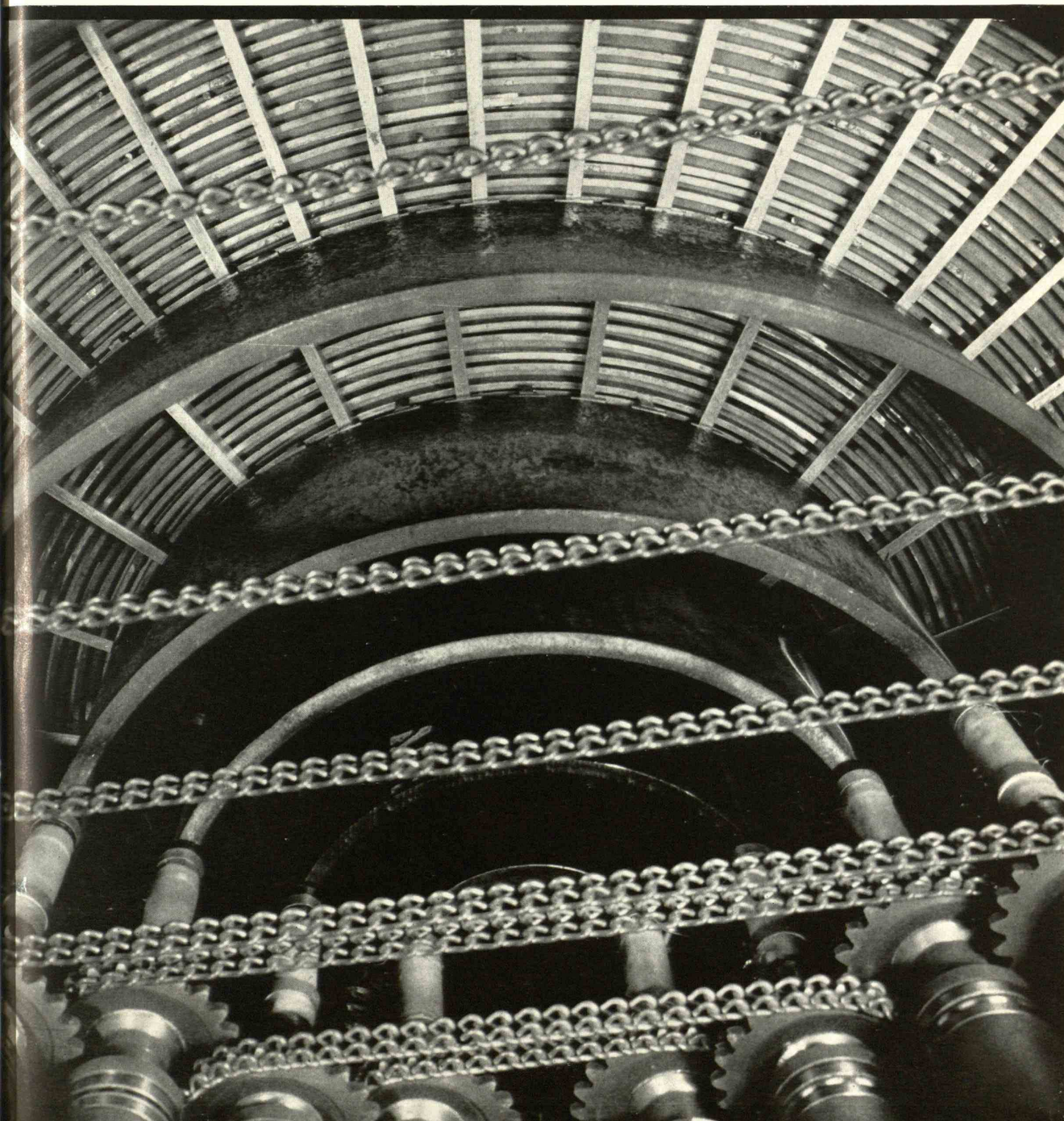
February 1945

TECHNOLOGY REVIEW

Title Reg. in U. S. Pat. Office



technology
review
Published by MIT

AIRCRAFT MASTER
SELECTOR VALVE

Forging

BEFORE MACHINING

THE HARVEY METAL CORPORATION

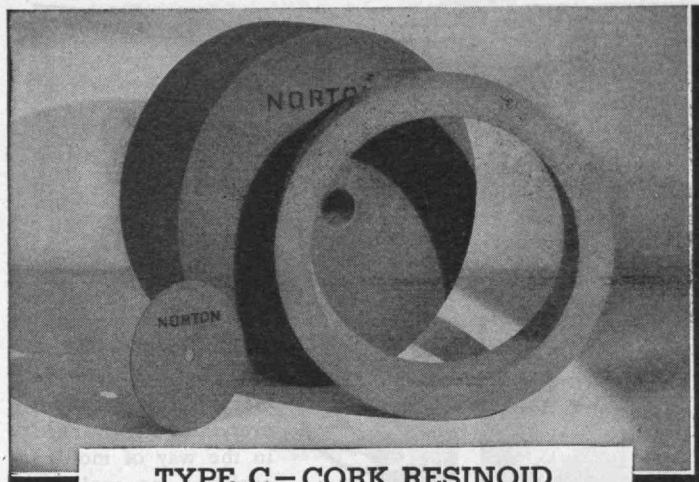
HAROLD B. HARVEY '05 • *Engineers & Manufacturers* • SHERRY O'BRIEN '17

74th STREET and ASHLAND AVENUE • CHICAGO 36, ILLINOIS

FORGINGS IN ALUMINUM • BRASS • BRONZE • COPPER • MAGNESIUM • MONEL • ALLOYS

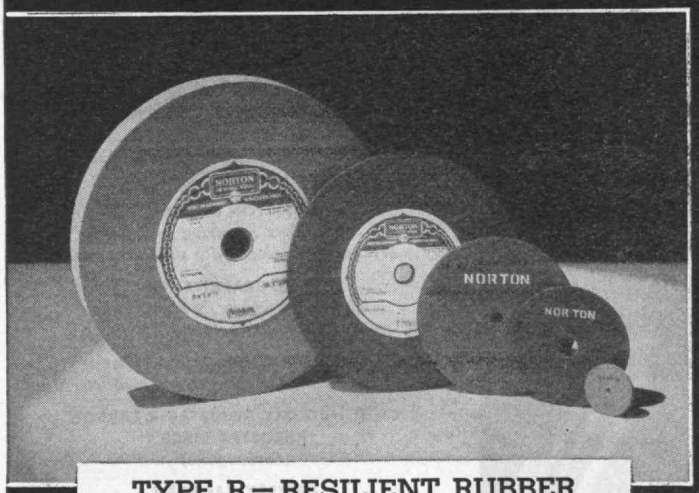
MACHINING FACILITIES

THE TECHNOLOGY REVIEW, February, 1945. Vol. XLVII, No. 4. Published monthly from November to July inclusive at 10 Ferry Street, Concord, N. H. Publication date: twenty-seventh of the month preceding date of issue. Annual subscription $3.50; Canadian and foreign subscription $4.00. Entered as second-class matter at the Post Office at Concord, N. H., under the Act of March 3, 1879.



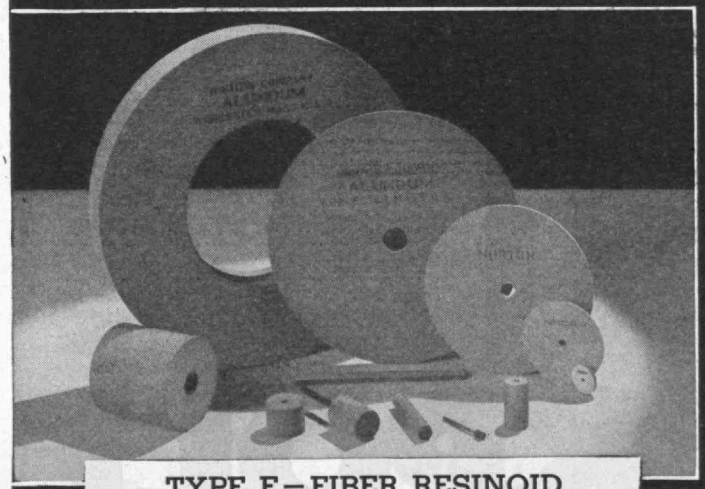
TYPE C—CORK RESINOID

Interested in getting readings as low as 2 micro-inches? Then try these and see what perfection really is. For operation at speeds up to 6000 s.f.p.m.



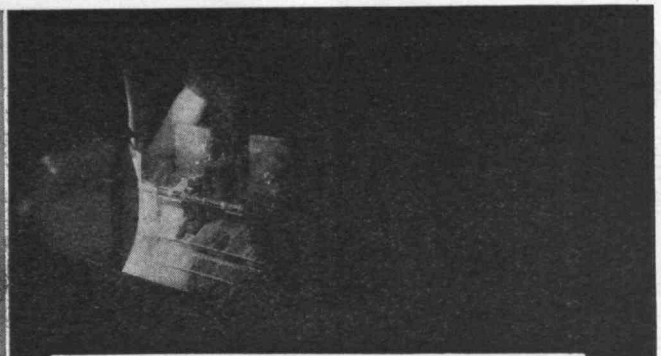
TYPE R—RESILIENT RUBBER

Do you like that s-o-f-t resilient action, where the wheel hugs the work without bump or chatter? Then use these for operation at 3300-6000 s.f.p.m.



TYPE F—FIBER RESINOID

Want to combine a light grind plus a polish in one operation? Use these for operation up to 7500-9000 s.f.p.m.



Announcing NORFLEX! POLISHING WHEELS!

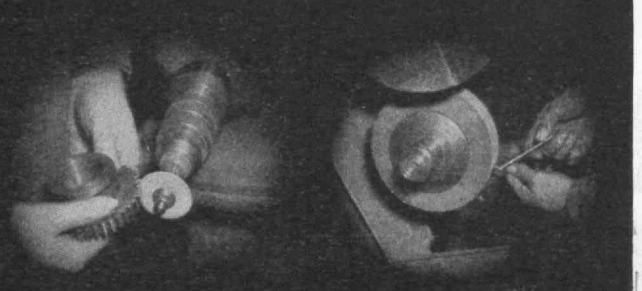
FROM polishing a tap or drill to breaking down corners of sheet stock or removing nicks or burrs from gears and other parts NORFLEX* Polishing Wheels cover the field thoroughly and completely. They come in three types, Cork Resinoid, Resilient Rubber and the latest Norton development—Fiber Resinoid. All three will now be known as NORFLEX* Polishing Wheels—all three develop a high finish.

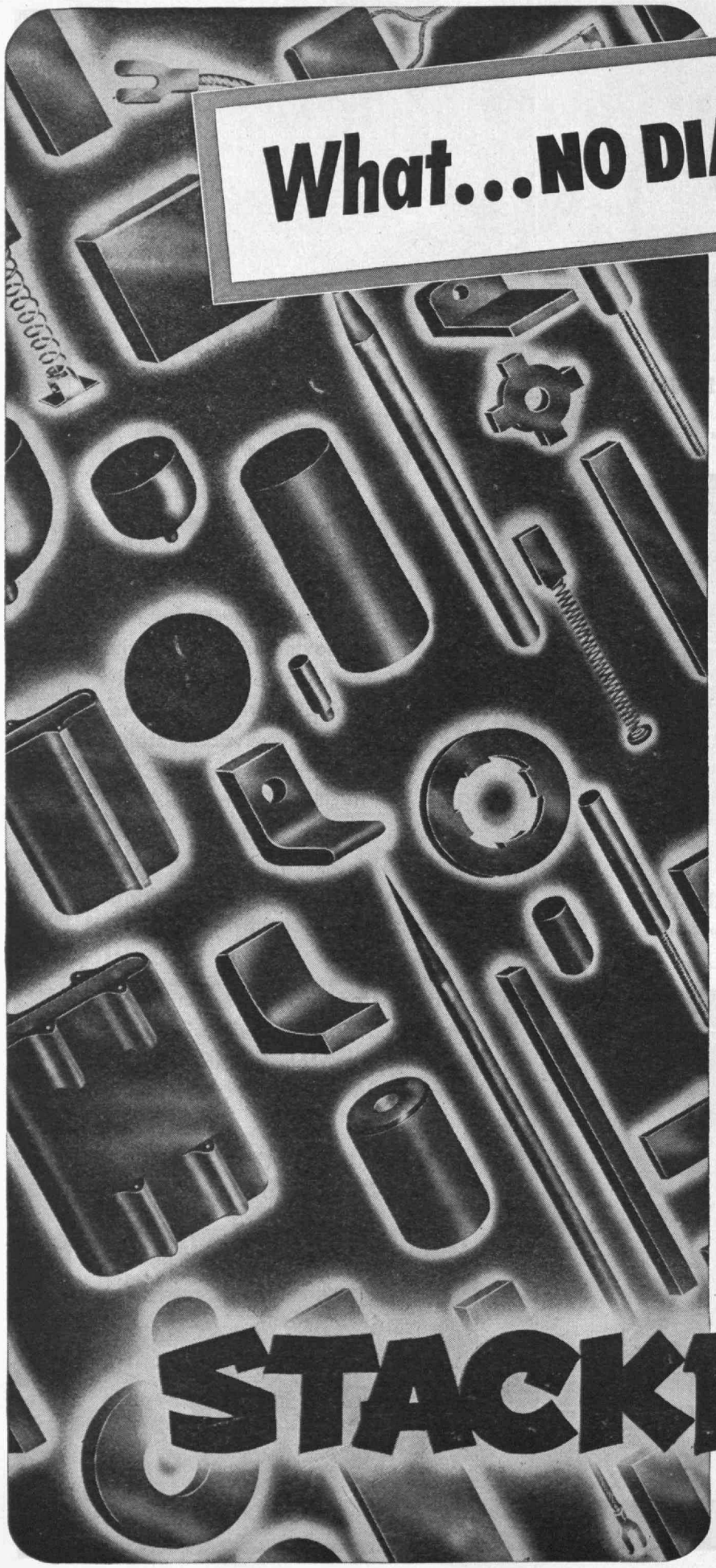
Your Norton abrasive engineer or Norton distributor will give you the complete story on NORFLEX* Polishing Wheels.

*Trade-mark

NORTON COMPANY
Worcester 6, Mass.

NORTON ABRASIVES





What...NO DIAMONDS?

Yes . . . no diamonds—but you can rely on Stackpole for just about everything else you need in the way of molded carbons, as well as graphites, metals, and compositions. The following give some idea of the extent of the Stackpole line:

SMALL MOTOR BRUSHES
The nation's largest producer of brushes for fractional horsepower motors, generators, etc.

BRUSHES FOR ALL ROTATING ELECTRICAL EQUIPMENT
All carbon, graphite, metal and composition types—also rare metal contacts

PACKING, PISTON and SEAL RINGS
For all applications requiring an effective seal between a rotating and a stationary part

SPECTROGRAPHITE NO. 1
High-purity graphite for chemical and metallurgical analysis

POWDER METALLURGY COMPONENTS
Small sizes having special electrical characteristics

CONTINUOUSLY ADJUSTABLE CARBON RHEOSTAT DISCS
(Carbon piles)

BATTERY CARBONS

WELDING RODS, ELECTRODES, PLATES

BRAZING BLOCKS

POWER TUBE ANODES

CHEMICAL CARBONS

CARBON PIPE

CARBON SPECIALTIES, ETC., ETC.

•

Special Electronic Components

FIXED AND VARIABLE RESISTORS
Volume and tone controls, etc.

IRON CORES
Standard and high-frequency types—insulated types, side-molded types, etc.

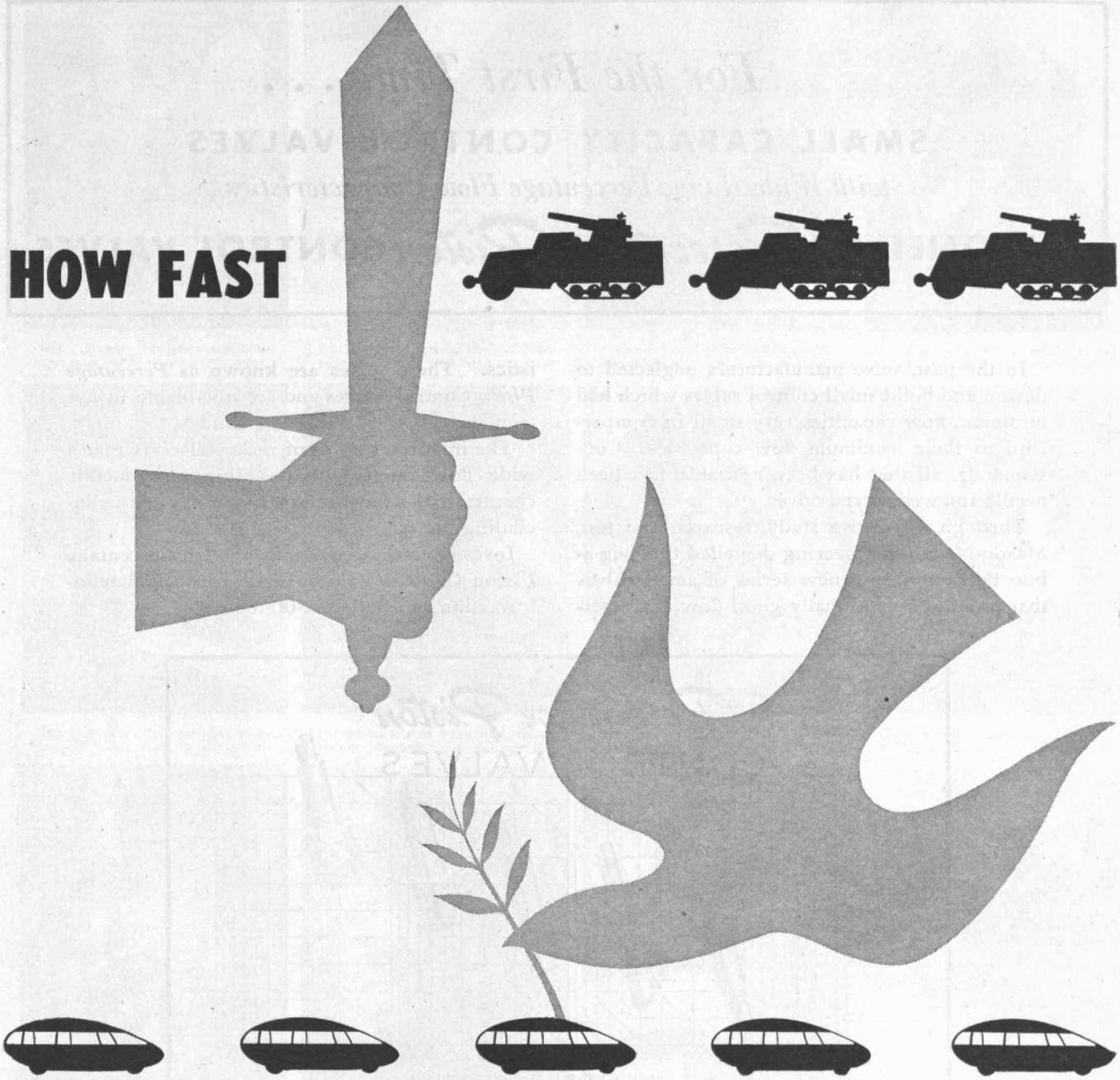
SWITCHES
Inexpensive line, slide, and rotary-action types.

WRITE for details on any product.

STACKPOLE

CARBON CO.

ST. MARYS, PA.



HOW WELL

• War has its emergencies which call for industrial production SPEED — often "at any cost."

• But peacetime industry has its *competition* — and that calls for EFFICIENCY of the highest degree.

• There must be no waste, either in plant construction or in plant operation.

• "Not *how fast* but *how well,*" will be the order of the era in which dollars will again mean something.

• Consider the engineering skill and know-how that Badger has accumulated throughout the pre-war and war years. This experience has become increasingly valuable to concerns contemplating new ventures, plant modernization, or additions to present refining or manufacturing facilities.

• Badger's care with details and over-all planning can mean worth-while savings in both investment and operating costs . . . savings which should ultimately prove of definite sales advantage.

E. B. Badger & SONS CO.

BOSTON 14 EST. 1841

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PROCESS ENGINEERS AND CONSTRUCTORS FOR THE CHEMICAL, PETRO-CHEMICAL AND PETROLEUM INDUSTRIES

For the First Time . . .

SMALL CAPACITY CONTROL VALVES

with Wide Range Percentage Flow Characteristics

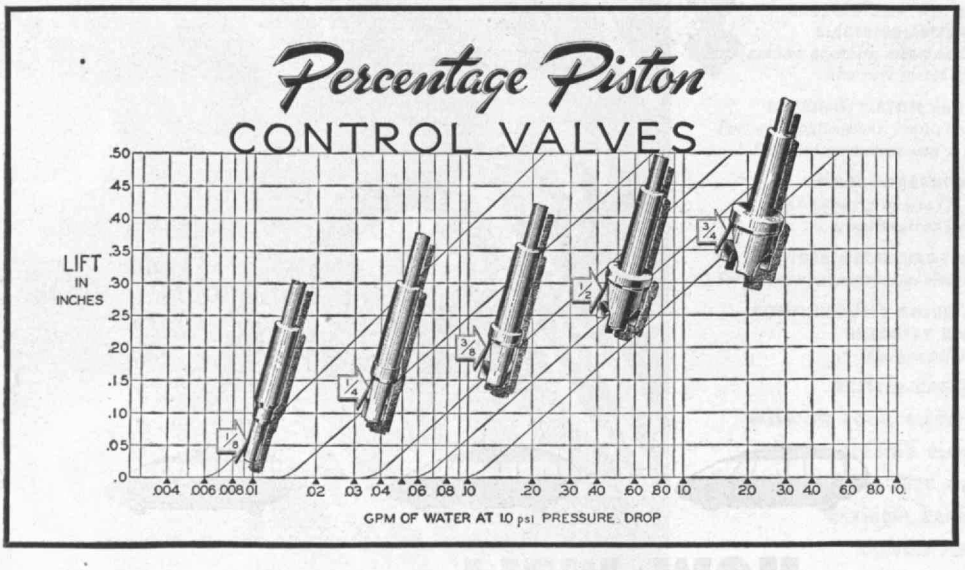
MASONEILAN *Percentage Piston* CONTROL VALVES

In the past, valve manufacturers neglected to design and build small control valves which had minimum flow capacities very small in comparison to their maximum flow capacities. Consequently, all that has been available has been needle and wedge type valves.

Through exhaustive study, research and test, Mason-Neilan Engineering dispelled this bug-a-boo by designing a new series of small valves that provide exceptionally good flow characteristics. These valves are known as *Percentage Piston* Control Valves and are obtainable in five trim sizes — ¾", ½", ⅜", ¼" and ⅛".

The important point of these valves is that a wide flow range with desirable reproducible characteristics has been obtained in all sizes including the ⅛".

Investigate these new Masoneilan Percentage Piston Control Valves. Write for complete information and Bulletin 300 today.



FEATURES

● A family of five trim sizes — ⅛", ¼", ⅜", ½" and ¾".

● The ports on all size plugs are milled in special fixtures for accuracy and reproducibility.

● Special design of the plug and the seat ring permits excellent flow characteristics over flow ranges of the same magnitudes obtained in larger valves.

● High Lift — All sizes have a ½" lift.

● The orifice diameter purposely has been held to a minimum to reduce the errosive effect of high velocity fluids and to reduce the leakage flow when operating near the seat.

● Single seated design insures tight shut-off.

● The extra large standard diaphragm motor used with this series of valves has an effective area of 46 square inches. This in combination with the high lift gives an exceptionally responsive unit.

● In addition to the standard air-to-close superstructure, a new simplified superstructure is available for air-to-open action.

● Trim size is interchangeable and conversion is accomplished by merely replacing the plug and seat ring.

● Standard trim is type 304 (18-8) stainless steel. Hardened stainless steel, bronze, monel or other special metals are also available.

● Body materials — Bronze, cast iron, cast steel, forged steel or alloy steel are standard.

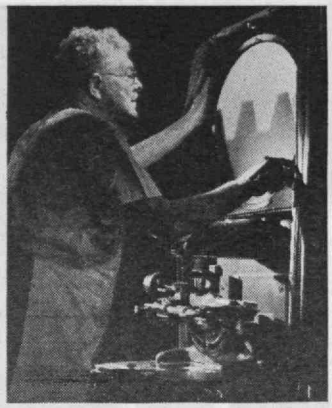
● Body design — Globe or angle type bodies, tapped ½", ¾" or 1" are standard.

MASONEILAN

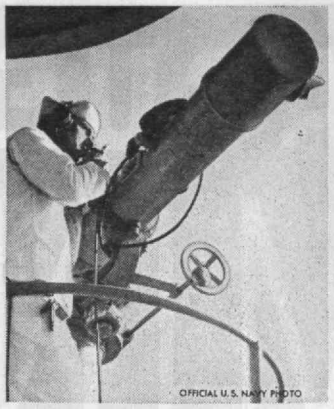
MASON-NEILAN REGULATOR COMPANY

1196 Adams Street, Boston 24, Mass., U. S. A.

New York Philadelphia Pittsburgh Toledo Chicago Tulsa Atlanta St. Louis Houston
Los Angeles San Francisco Mason Regulator Co. of Canada, Ltd., Montreal, Canada



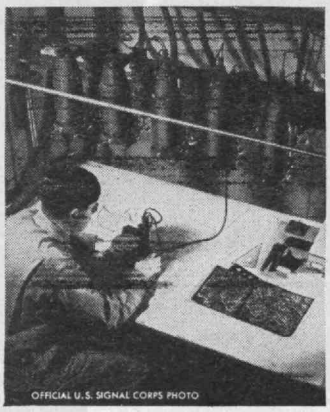
B&L Contour Projector magnifies tiny gear with accuracy to .0001"



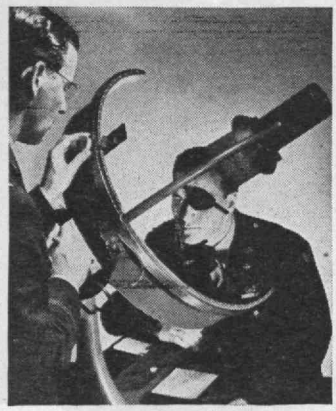
B&L Range finders enable U. S. Navy gunners to hit a ship 17 miles away

Precision aerial camera photographs enemy territory with B&L lenses

Bomber navigators use B&L Sextant to plot course by sun, moon, stars



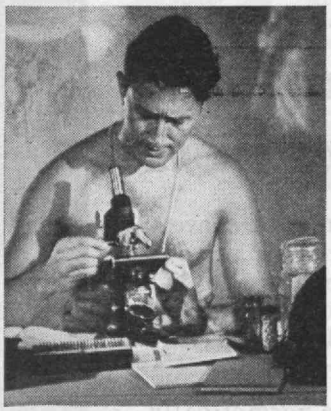
B&L Multiplex Projector plots topographic maps from aerial photos



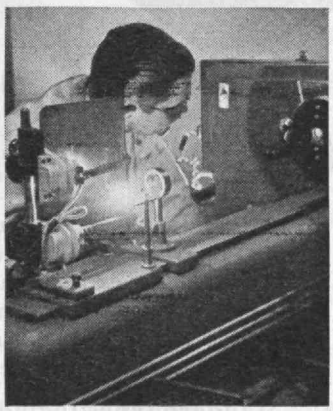
Perimeter, one of many B&L vision testing instruments in military use

B-29 fliers, too, wear B&L Ray-Ban anti-glare glasses on Tokyo air raids

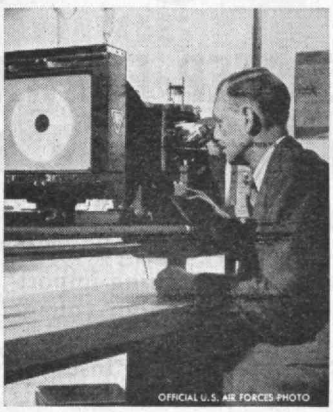
Coast Guard officer on convoy duty scans horizon with B&L Binocular



Medical Corps uses B&L Microscopes



B&L Spectrograph for metal analysis



B&L Research Metallographic Outfit

The B&L Anti-aircraft Height Finder

Here Are the Eyes of Victory

Allied might is rolling up a smashing record of individual victories that point to ever-more-imminent *total* victory.

The way in which American industry supports its fighting men is astounding our allies and confounding our enemies. In the production of war materiel, industry and science have cooperated to make our hard-hitting forces the most completely equipped in the field.

Optical science has made and is making its contribution to this production record.

In fire-control—in aerial reconnaissance—in improving the vision of fighting men and production workers—in inspection instruments that make possible the precision our weapons demand—optical science provides the "Eyes of Victory."

Because Bausch & Lomb was prepared with manufacturing facilities (including its own optical glass plant) and a personnel trained and experienced in optical science, an otherwise certain shortage in vital optical equipment was averted.

As long as American men are fighting, Bausch & Lomb will continue to center its efforts on military needs. After that, Bausch & Lomb knowledge and capacity will again be devoted to making life better through optical science, optical instruments and optical methods.

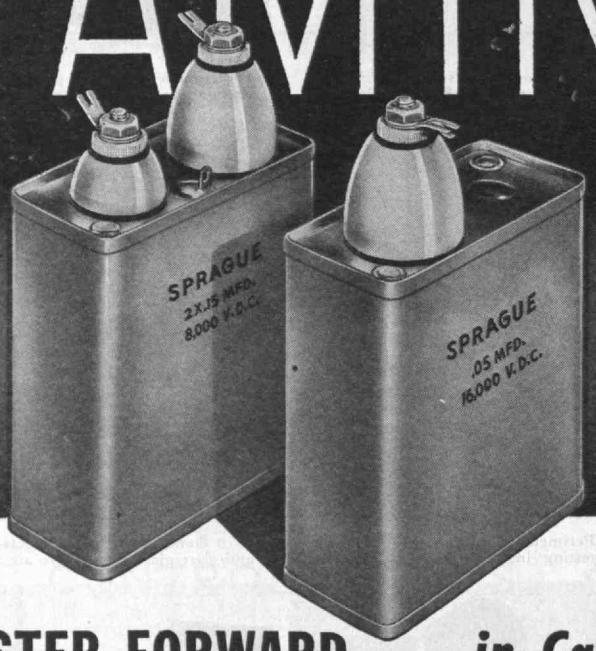
BAUSCH & LOMB

OPTICAL CO., ROCHESTER, N. Y.

EST. 1853

Makers of Optical Glass and a Complete Line of Optical Instruments for Military Use, Education, Research, Industry and Eyesight Correction and Conservation

SPRAGUE VITAMIN-Q*



A BIG STEP FORWARD . . . . *in Capacitors for High Temperature, High Voltage Applications*

Vitamin Q impregnant, pioneered and perfected by Sprague, has resulted in capacitor developments of far-reaching importance for high temperature, high voltage applications. Although extremely compact, Sprague Type 25P Capacitors, for instance, operate satisfactorily at thousands of volts *at ambient temperatures as high as 105° C.* Moreover, their leakage resistance at room temperature is *20,000 megohms ÷ microfarads*—or at least five times higher than that of previous types.

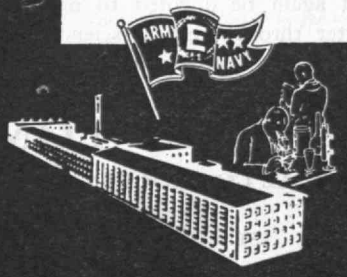
Sprague Vitamin Q impregnated Capacitors retain all of the virtues of conventional oil-impregnated capacitors throughout the extreme range of + 105° C. to —40° C. Used where high temperature is not a factor, they result in materially higher ratings for a given size.

Standard types include hermetically sealed rectangular metal container units in styles for 95° C. and 105° C. continuous operation, and in d-c rated voltages from 1000 to 16000 V. Other types include Type 45P hermetically sealed in glass shells with metal end caps.

SPRAGUE ELECTRIC COMPANY, North Adams, Mass.

(Formerly Sprague Specialties Co.)

*TRADEMARK REG. U. S. PAT. OFF.



SPRAGUE CAPACITORS KOOLOHM RESISTORS

Sandee

PLASTIC INSULATION

OFFERS MANY IMPORTANT ADVANTAGES

SANDEE Thermo-plastic compounds and exclusive extrusion methods bring new efficiency to electric wire and cable insulation. Exhaustive tests reveal many superior advantages — features heretofore considered impossible to obtain all in one material. Sandee Flexible Plastic Tape and Tubing is custom-made to exacting specifications in any practical size, wall thickness, length and color. It is manufactured to rigid standards of uniformity and *can be imprinted with identification marks or numbers* if desired. Send for samples and prices. ★ Also ask for details concerning the wide variety of *rigid* plastic stock and custom sections we make. Sandee Extruded Plastic products are now specified in huge volume by many of America's best known users of these materials.

ELMER SZANTAY, M.E. '35, GENERAL MANAGER

Sandee Manufacturing Company

3945 NORTH WESTERN AVENUE • CHICAGO, ILLINOIS

EXTRUDED PLASTICS AND SPECIAL TOOLS

THE TABULAR VIEW

Aqua, Regina. — So many of the materials and instrumentalities with which an engineering and technological civilization deals are compellingly mysterious that it is very easy to ignore less esoteric but even more important components. One such is the ubiquitous fluid which is discussed in this Review (page 233) by PAUL COHEN in an article marked by its author's pronounced facility at assembly of pertinent data and at shrewd comment thereon. A graduate of the Institute in 1935, Mr. Cohen has been an editorial associate of The Review since 1938. During these years his versatile typewriter has provided able substance for "The Trend of Affairs" as well as numerous articles on various aspects of science and engineering, particularly their social implications.

Prognosticators' Puzzle. — An embarrassment of riches may be facing producers, users, and fabricators of magnesium at the end of the war, for a surplus supply is even now on hand, and production capacity and knowledge are by no means slackening. To balance against this implied difficulty are the varied virtues of the metal, which may be expected to make it useful in manifold ways. The prospect is that of transition and testing, out of which stabilization may be foreseen. To appraise and evaluate such a future is obviously a task demanding not only thorough knowledge of the field as it exists but also the common sense that identifies a guess as a guess. In the concluding installment of his discussion of the future of magnesium (page 236) MAJOR ARTHUR LOWERY, chief of the magnesium wrought products and development section of the War Production Board, evidences both qualifications. Major Lowery holds bachelor's and master's degrees from the Institute and is a member of the Class of 1932.

Erstwhile Superlative. — Over the past five years, The Review has published a group of glimpses into the history of American ships and shipping — essays in history which result from the fact that COMMODORE W. MACK ANGAS, now with the Seventh Fleet, is a student as well as a skilled practitioner of his calling as a Navy man. In this issue (page 239) appears the story of an American superliner of years long gone, which Commodore Angas prepared for The Review before his duties called him to regions where the historian's files and the urbane writer's keyboard are not in general available. The Collins line and its well-intentioned but ill-omened *Adriatic* afford interesting commentary on a kind of ocean travel unlikely to be renewed even in modern guise. For practically the entire span since his graduation from the Institute in 1917, Commodore Angas has been an officer of the Civil Engineer Corps of the Navy.

Not New. — In days when "racism" and cognate isms are blandly bandied about, M. F. ASHLEY MONTAGU contributes to this Review (page 229) a valuable observation on cultural as distinguished from physical changes in mankind, particularly as they apply in the United States. Associate professor of anatomy in the Hahnemann Medical College and Hospital of Philadelphia, Professor Montagu is well known to Review readers for contributions on varied topics in the field of cultural history.

MAIL RETURNS

Add Unloaders

FROM JACKSON G. FLECKENSTEIN, '19:

The November Review published a letter from Gerard Chapman, '36, of Cloquet, Minn., wherein he mentions that the New York *Times* carried a picture showing an ore carrier unloading iron ore at Sault Ste Marie, which he intimates is impossible as there are no furnaces at the Soo.

It is true there are no blast furnaces at Sault Ste Marie, Mich., but just across the narrow St. Marys River is Sault Ste Marie, Ontario, and there are some very large steel plants in the Canadian Soo. I have spent considerable time in the Canadian Soo in recent years, as some few hours north of there one will find the finest fresh-water fishing in the world and some of the best hunting, too. In talking with residents of the Canadian Soo, I recall being told that because of the poor quality of the Canadian ore, the steel mills at the Canadian Soo operate on Minnesota ore for about 80 per cent of their capacity, using only about 20 per cent of Canadian ore that comes down by rail.

The foregoing comments are perhaps of no interest, but nevertheless the New York *Times* might still have been correct in showing a picture of an ore carrier unloading at the (Canadian) Soo.

Ionia, Mich.

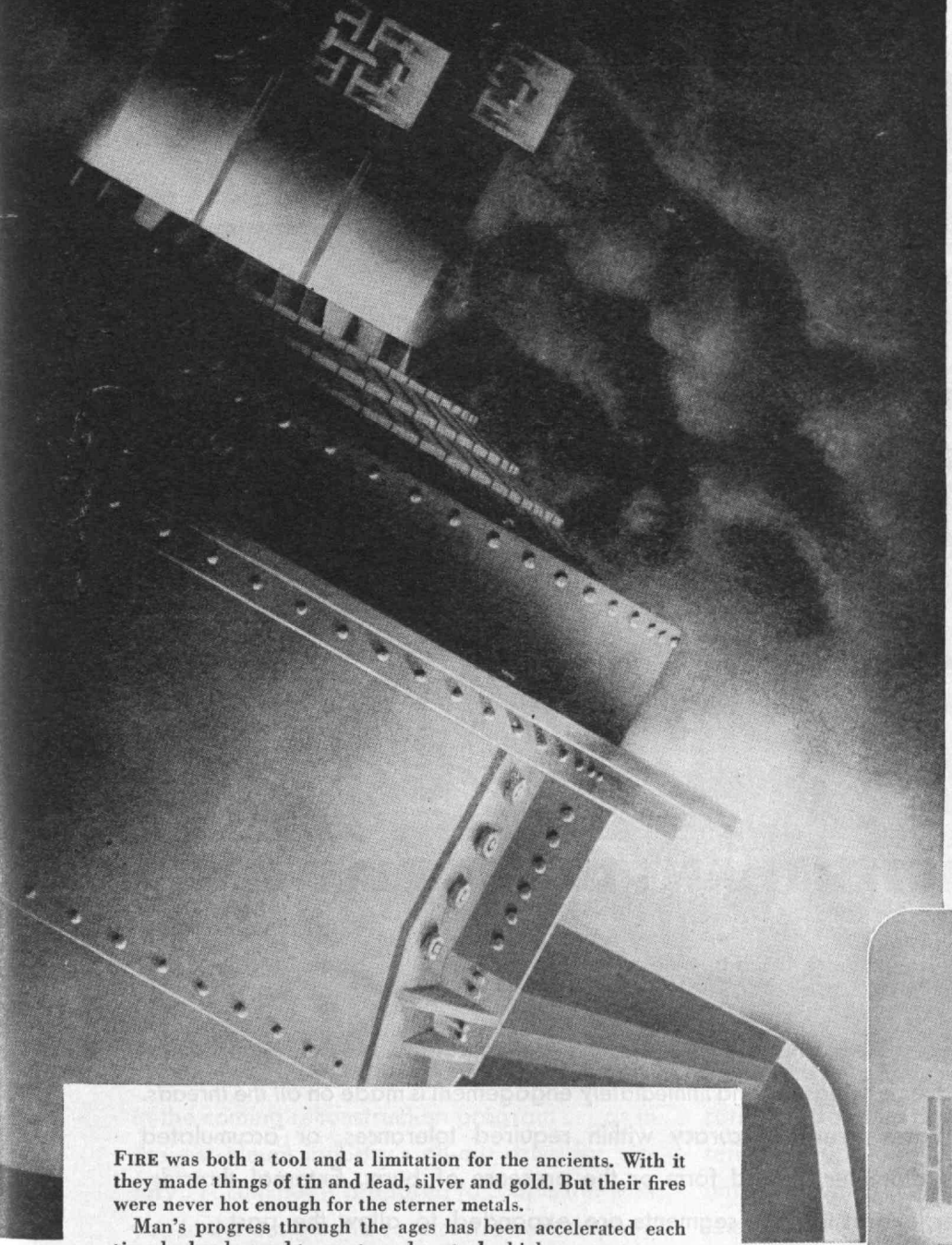
Ends and Means

FROM EVE WITHERS:

The article discussing synthetic training devices utilized in the instruction of naval personnel published in your issue for November demonstrates that there has been no slackening in the ingenuity with which Americans can ease the learning process by means of physical systems and implements. That the Navy is at present employing these devices principally for the teaching of techniques and the development of proper reflexes and co-ordination is entirely proper; it would be most unfortunate for this fact, however, to obscure in our thinking the very great potentialities available in such devices for educational operations having other purposes. I do not by any means intend to imply that in the peacetime years ahead we can relegate to the machine any teaching which has to do with the formation of judgments. But such teaching in past peacetime years has been under a heavy handicap of lack of time and energy because of the great amount of effort which must be expended in a technological world upon training in techniques.

If the Navy's trail-blazing makes it possible for schools later to free teachers for more teaching of thinking rather than manipulating, a great good will have been accomplished.

Cambridge, Mass.



When is FIRE *too* COLD?

FIRE was both a tool and a limitation for the ancients. With it they made things of tin and lead, silver and gold. But their fires were never hot enough for the sterner metals.

Man's progress through the ages has been accelerated each time he has learned to create and control a higher temperature.

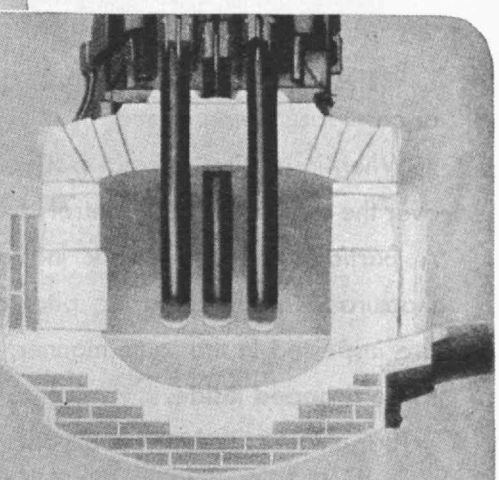
With the electric arc came heat hotter than any fire. And, by means of carbon or graphite electrodes—developed by research of NATIONAL CARBON COMPANY, INC., a Unit of UCC—man put the electric arc to work in furnaces such as the one you see above.

Born in the terrific heat of the electric furnace are many of the alloy steels used in ships, trains, planes and other equipment, and also the ferro-alloys that give strength, toughness, hardness—or the quality of being stainless—to these steels. These materials—and the intense heat that produces them—are vitally necessary to American industrial progress.

▼

Coming from the electric furnace—in addition to alloy steels and ferro-alloys—are phosphorus, abrasives, calcium carbide for acetylene used for welding and cutting, and many special alloys.

For further information write for booklet P-2, "The Story of the Carbon Arc" . . . there is no obligation.



Cross Section of an Electric Furnace

Electricity comes *to* the furnace on metal bars. It is carried *into* the furnace by carbon (or graphite) electrodes, which you see projecting down into a brick lined bowl. Carbon is used because, unlike metal, it will not melt.

You see carbon in many forms other than electrodes. Diamonds are pure carbon. Graphite, which is the "lead" in pencils, is carbon—and so are coke and charcoal. This material is the subject of unending research by the National Carbon Unit of UCC.

BUY UNITED STATES WAR BONDS AND STAMPS

UNION CARBIDE AND CARBON CORPORATION

30 East 42nd Street UCC **New York 17, N. Y.**

Principal Units in the United States and their Products

ALLOYS AND METALS—Electro Metallurgical Company, Haynes Stellite Company, United States Vanadium Corporation

CHEMICALS—Carbide and Carbon Chemicals Corporation **ELECTRODES, CARBONS & BATTERIES**—National Carbon Company, Inc.

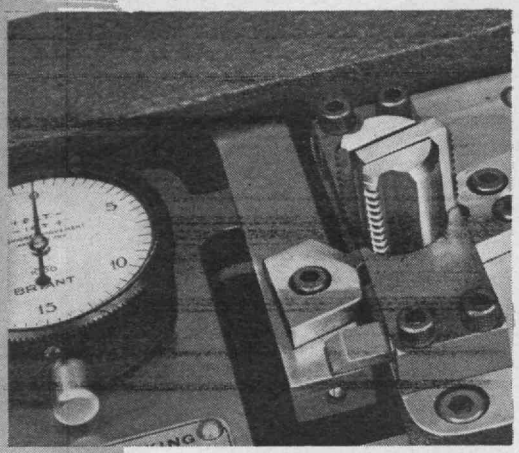
INDUSTRIAL GASES AND CARBIDE—The Linde Air Products Company, The Oxweld Railroad Service Company, The Prest-O-Lite Company, Inc.

PLASTICS—Bakelite Corporation

EXTERNAL

INTERNAL

Elimination of threading



MAKES THE *Bryant Thread Gage*

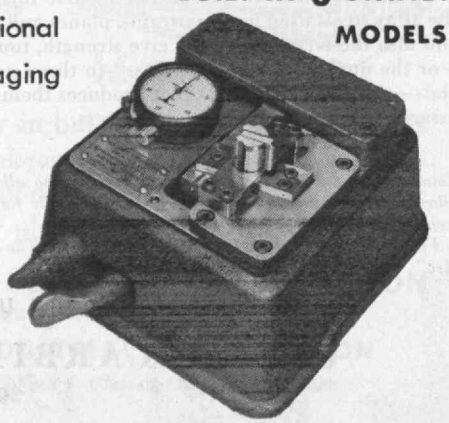
4 TO 5 TIMES FASTER THAN PLUG OR RING GAGING

Bryant Thread Gages completely eliminate tedious, time-consuming threading of gages into or onto parts being inspected.

When inspecting internal parts, the segments are retracted by the control lever — the work is dropped over the segments — the control lever is released, and *immediately* engagement is made on *all the threads.* A *partial* turn of the work indicates overall accuracy within required tolerances, or accumulated inaccuracies of lead, taper, pitch diameter, thread form or the presence of burrs. External threads are inspected in the same manner, except that the segments are expanded to allow the part to be dropped inside.

The unique design of Bryant Thread Gages practically eliminates wear on the segments — it allows inexperienced help to inspect threaded parts four to five times faster than experienced inspectors using conventional gages — it eliminates the "feel" required in plug and ring gaging — it offers a method for complete, overall inspection of master plug and ring gages, and a method of transferring their accuracy to production threaded parts.

BUILT IN 3 STANDARD MODELS



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Bryant **CHUCKING GRINDER COMPANY**

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FOR A MODERN LUBRICATING OIL PLANT

Low in Investment Cost... Low in Operating Cost

In the coming reconstruction program . . . as in the petroleum industry's all-out drive for victory . . . Lummus is prepared to cooperate with you in the design and construction of complete plants to produce high yields of high viscosity index, low pour lubricating oils.

In the forefront of lubricating oil construction for more than a decade, Lummus has built a large proportion of the world's solvent lubricating oil refining capacity — fourteen solvent refining plants and nineteen solvent dewaxing units, including complete lubricating oil refineries.

To the design of lubricating oil plants, Lummus brings a wealth of experience plus the latest advances in Vacuum Distillation, Propane Deasphalting, Furfural Refining, Benzol-Ketone Dewaxing and Clay Finishing.

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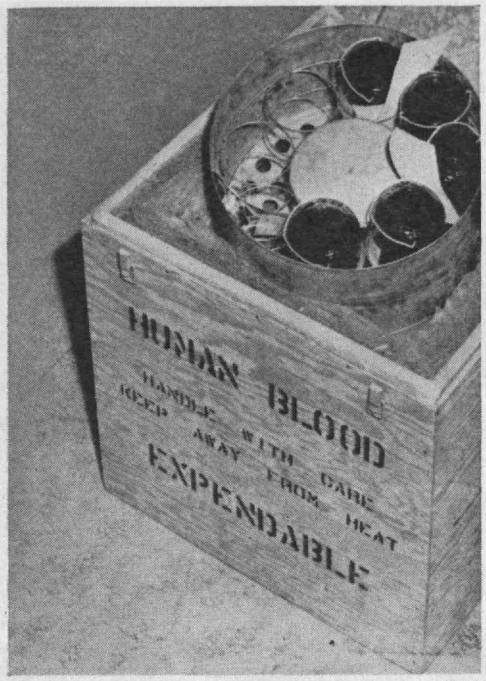
VOLUME 47 NUMBER 4



Sid Tate

The price of liberty

THE TECHNOLOGY REVIEW

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CONTENTS for FEBRUARY, 1945

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Martin Rosse, '40

William W. Lewis, '89

North or South, elementary culinary technology has much the same outline. Above is an oven on the road between Tehuacan and Puebla in Mexico; at the right, one at Trois Pistoles on the Gaspé Peninsula in Quebec.

THE
TECHNOLOGY
REVIEW

Vol. 47, No. 4

February, 1945

The Trend of Affairs

The Golden Years

IT would be hard to challenge the statement that high among the trends of greatest significance to the future of our present world is that toward a longer life expectancy for the average individual. In the Eighteenth Century, which as far as life span is concerned did not differ much from previous ages or from such countries as India or China today, a man in his thirties had achieved par for the course. In the more advanced countries of today, however, the average life expectancy, barring the cataclysms of war, has climbed above 60 years. Whereas only 17 per cent of the population in the United States was over 45 even as late as 1900, over 26 per cent of the population has reached that age today.

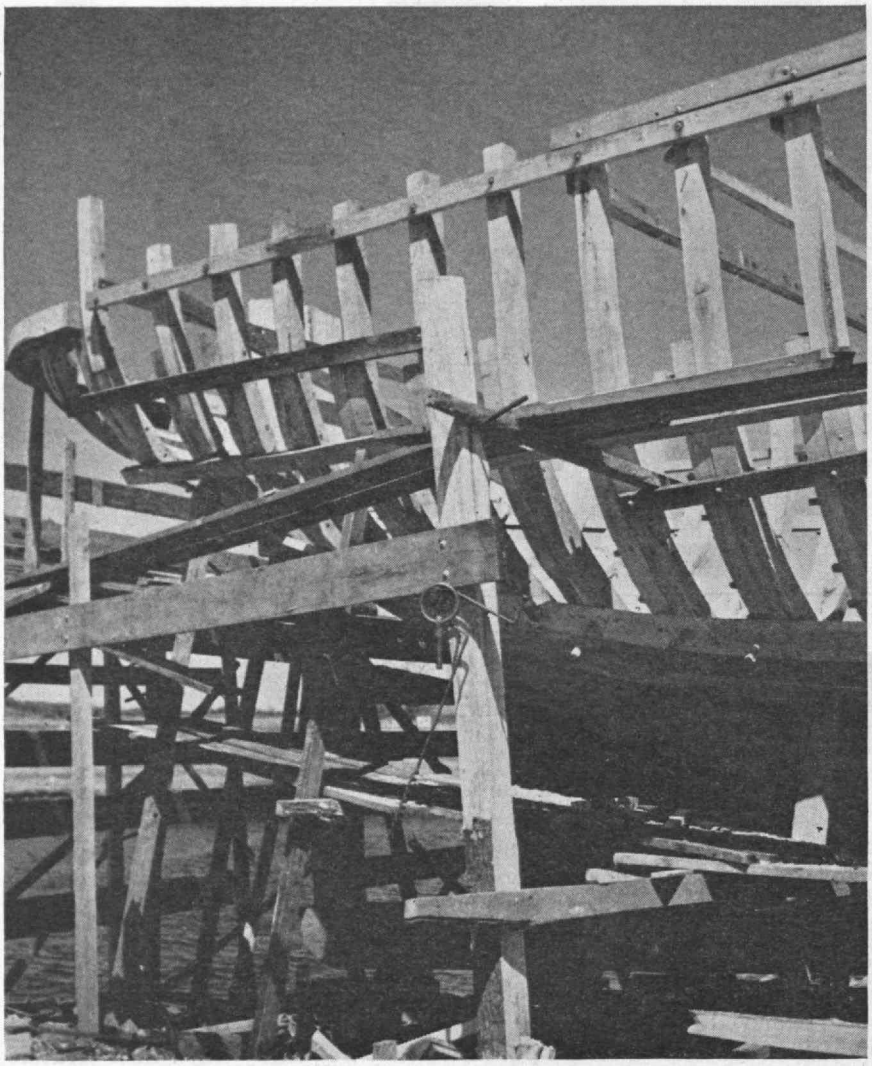
Naturally, more and more interest is being displayed in those characteristics of older people which affect their general value to society. Among them is the relation between mental effectiveness and chronological age, although it need scarcely be mentioned that the measurement — indeed the definition — of mental effectiveness is a matter of considerable uncertainty and that individuals of the same chronological age can differ greatly in the degree to which physiological or mental functions have been impaired.

Harvey C. Lehman, basing his choice of outstanding creative works mainly on the frequency with which they were mentioned by authorities in the field, has published in *Scientific Monthly* a large number of plots wherein the frequency with which such works occur is plotted against chronological age. With monotonous regularity, output of highest quality is most apt to be at its peak between the ages of 30 and 40, whether the field be geology, psychology, mathematics, short-story writing, or the composition of poems sung as hymns. In plotting 52 of the greatest chemical discoveries made by 46 men now dead, Lehman finds that the years between 25 and 30 were the most fruitful. Perhaps the stimulation of our fast-moving society, the widespread educational facilities, and the greater eagerness with which creative work is greeted today are the factors which have smoothed the path to fame; but from Lehman's figures, geniuses would appear to flower more quickly now than they did several centuries ago. This fact does not mean that men cannot do their finest work after achieving middle age. They are merely less apt to do so.

The late Thomas Midgley, Jr., made an analysis of inventors with substantially similar results. Great inventions were produced most frequently when their creators were between 25 and 45, although Perkin synthesized aniline dyes when he was 18, Ericson built the *Monitor* when he was about 60, and Harvey produced Harveyized steel when he was 67. Midgley made no bones about his belief that "youth is original and creative" and a requirement of genius. But he also pointed out that young men are more eager to achieve success than are older men and that, after producing an outstanding invention, many men must devote much of the concentrated attention of their later life to the development and management of that invention.

On the other hand, there are certain fields where age rather than youth is a normal prerequisite. While W. A. N. Dorland's data indicate that maximum achievement occurs on the average at an age of 41 for physicists and 44 for inventors, poets, and playwrights, it is 46 for novelists, 52 for statesmen, and 58 for jurists. Lehman also agrees that politicians most often achieve their highest rank between 50 and 60 and that the authors of what are recognized as the "best books" ordinarily do their finest work between 40 and 44.

The general trend is clear in spite of some discrepancies. For highest achievement in specialized, sharply defined fields where the premium is on sheer originality and grasp of complicated and novel data, the golden years come early. But when judgment, experience, balance, and an understanding of many different fields of knowledge are required, then there is no effective substitute for a long and full life.



Murine Unemployment

WHITE rats are obsolescent. For purposes of nutritional testing, these classic laboratory experimental animals, together with others of their kind, are being increasingly replaced today by micro-organisms.

A current focus of nutrition research is upon the vitamins, giving rise to recurrent necessity for accurate quantitative assays of these accessory food factors, usually in concentrations so minute as to be measured in micrograms (millionths of grams) or even in millimicromols (billionths of gram molecular weights). Most of the vitamins have been identified as chemical entities, a fact which in some cases makes possible the assay of them by chemical means. But the fundamental measure of the potency of vitamins is their biological effect — commonly either their effect upon growth or their curing of lesions caused by vitamin depletion, as shown in mammalian laboratory animals such as the rat or guinea pig.

Laboratory animals for these or any other tests should have short generation times, so that large numbers of them are quickly and cheaply available. Also they must be small, so that they occupy a minimum of space and consume little food. For usefulness in nutritional experimentation, the animal must also require in its nutrition the particular food factor, such as a vitamin, which is being studied. At first blush the white rat appears to be ideal. Its gestation period is 21 days. Breeding begins at an age of 110 days. An adult weighs only 200 grams and eats but 15 grams or so of food a day. Above all, nutrition of the white rat closely parallels that of the human being, for whose benefit most nutritional research is performed.

The white rat's fecundity, however, dwindles beside that of micro-organisms, which reproduce as often as every half-hour. As to size and food consumption, millions of microbes can thrive in a small test tube, in a few cubic centimeters of dilute nutrient solutions.

But these micro-organisms — these bacteria and yeasts — are primitive forms of life, and they are plants; what use can they possibly be in nutrition experiments whose ultimate application is to the human organism? In recent decades, as microbiologists stepped beyond the purely descriptive aspects of their science and delved into the biochemistry of microbes, they learned that these organisms are most fastidious in their nutritional requirements. They also learned that certain microbes depend upon the same accessory food substances, including vitamins, as does man.

Obviously, then, microbes may be used as test organisms for vitamin determinations. All that is required is preparation of an artificial medium lacking the vitamin it is desired to measure, addition of the unknown to this medium, and then observation of growth of a micro-organism in this substrate, the micro-organism being usually a bacterium or a yeast dependent upon the particular vitamin. Such procedures, called microbiological methods, are now in wide use. They are readily made quantitative by measurement of the extent of growth of the test organism. The experimenter determines this by measuring final turbidity of the initially clear medium, titrating the acidity which results from microbial metabolism, or gauging manometrically the gas evolved in those methods which use fermentative yeasts or bacteria. Microbiological techniques have recently been extended, with complete success, to measurement of amino acids, the compounds which in various combinations make up all the different proteins.

Because of the intense biological activity and short life span of micro-organisms, the results of microbiological assays are available within a matter of hours in contrast with the weeks or even months required to complete tests using laboratory mammals. The accurate, quick, inexpensive microbiological tests for vitamins and amino acids have immeasurably accelerated the tempo of modern nutrition research.

Power Steering

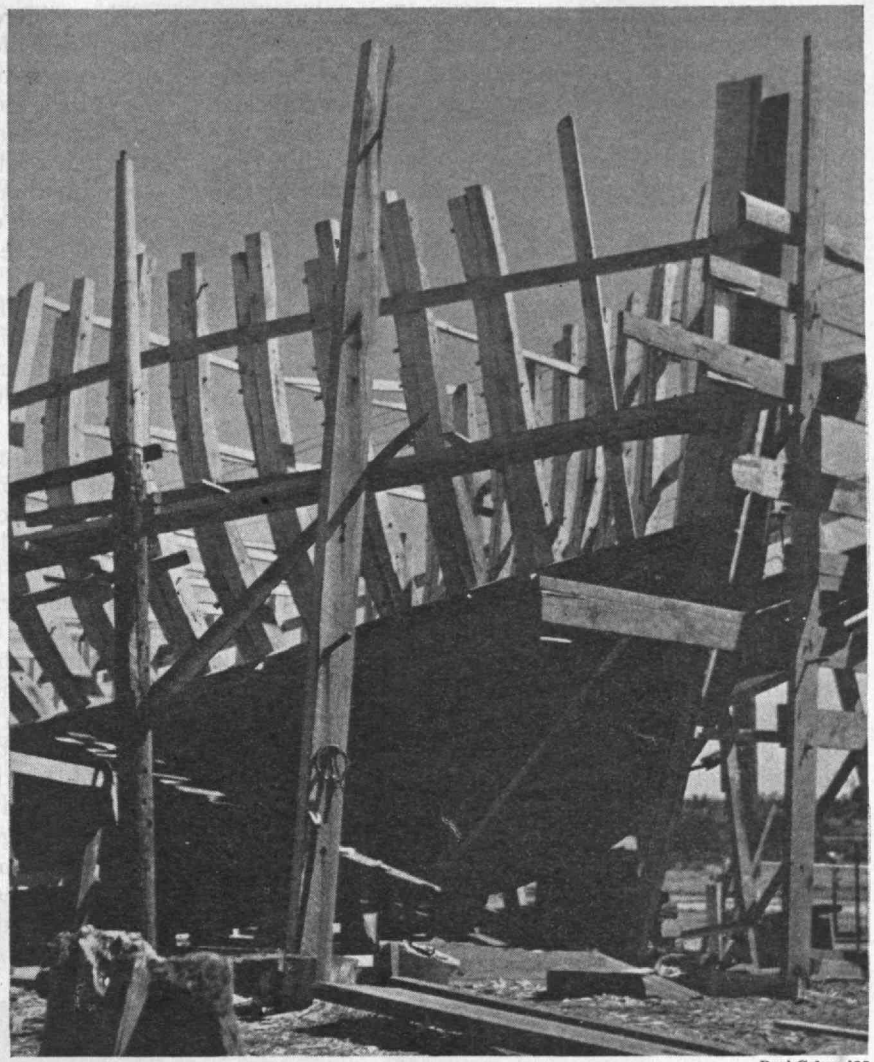
A RECENT article on heavy vehicles remarked, apropos the design of truck cabs, that truck drivers have big feet and that provision for same had better be made in the cab. In fact, truck drivers tend to be big all over, since, with the steady increase in weights of heavy

vehicles, it takes a man of better than average strength to steer many of them. That the steering problems of such vehicles have not become critical earlier is due mainly to the noteworthy increase in the efficiency of manual gears (from 25 per cent to over 75 per cent) during the past 25 years.

The continued rise in front axle weights, however, has at last resulted in a number of vehicle types — one with a weight of about 20,000 pounds on its front wheels — which cannot be steered by hand in any practical manner. Even large passenger cars, when standing still on dry concrete, need a pull of more than 30 pounds on the steering wheel, and although heavier pulls and slower steering gear ratios are permissible in trucks, these are still not enough for the heavier units. Another case where the capacity of human muscles has been exceeded is the ground maneuvering of large planes equipped with tricycle landing gears. Power assistance must therefore be furnished, and a number of vacuum, compressed-air, and hydraulically operated steering gears are now being made in this country.

In a paper presented before the January meeting of the Society of Automotive Engineers in Detroit, Francis W. Davis discussed the development and problems of power steering gears. In lightening the driver's burden, such gears must not lose the good qualities of manual gears — for example, their ability to transmit to the driver the "feel" of the road, the little bumps and pulls that amplify to an important extent his visual observation of road conditions. Furthermore, the introduction of a servo mechanism should not noticeably increase the lag between the driver's movement of the wheel and the response of the vehicle. Power gears can also have one quality not yet possessed by manual gears, that of damping and absorbing severe road shocks such as occur when a vehicle strikes a deep rut or does off-the-road work. Otherwise, such shocks can wrench the wheel from the driver's grasp and frequently injure his hands.

The Army is now using power steering gears in armored cars, wreckers, and tank recovery units. Commercial applications are being made in busses, tractors, snowplows, and off-the-road vehicles. While applications today are made only in places of maximum necessity, the use of such gears is expected to spread to lighter trucks and perhaps to heavy passenger cars.



Paul Cohen, '35

No Such Thing

By M. F. Ashley Montagu

WHERE every woman is born beautiful and every male comes into the world so recognizably an American that if you put him down as a baby in the middle of the Sahara he'd grow up into a sallow-complexioned, cigar-smoking, hardheaded gink hankering to know how tall it is and how much did it cost."

Of course, the speaker was exaggerating. What he was trying to say was that as well as having developed a distinctly American way of life, the American had also developed a new physical type, an American race type which is uniquely American. If there is anything at all in this idea of a new race — the American race — being developed here, some of our demagogues may speak in future of an American race as the Germans speak of a German race and the British sometimes speak of a British race. They would do so with even less justice than the Germans and British. These are not races, but nations or commonwealths. A race is a group of people which exhibits a community of inherited physical characters which distinguishes them from all other peoples. There is no such thing as an American race.

Yet we know that when a foreign-born person has become to some extent Americanized, he often somehow comes to look like what we think an American looks like. The clothes he wears help, but it is not altogether the clothes — he has the same look in his bathrobe. It's his manner and something in his face. But the fact of living in America has not produced a physical change in him. His quality of looking American is due to the effects of social, not physical, factors. The person who enters into American culture as completely as he is able invariably comes to behave like an American; and since the expression of his face reflects the kind of things he has been thinking and feeling in the process of becoming Americanized, it is not

surprising that he should come to look like an American. Definite physical changes *are* going on in the different groups in the population, but in the absence of intermixture between these groups they would not be sufficient to produce a unified American race type. Hence, any prediction as to the future development of such a type is contingent upon the future of race relations in this country.

The physical changes affecting the various ethnic groups and the descendants of immigrants in this country were made the subject of inquiry 35 years ago by America's most distinguished anthropologist, Franz Boas. The facts which he discovered were so startling that when they were first published in 1911, many scientists refused to accept them on the ground that they undermined the belief in the stability of human types, in the unchangeableness of man. In view of the confirmation which Boas' work has received in recent years from several independent workers, the facts which were so startling in 1911 have become a commonplace of anthropology.

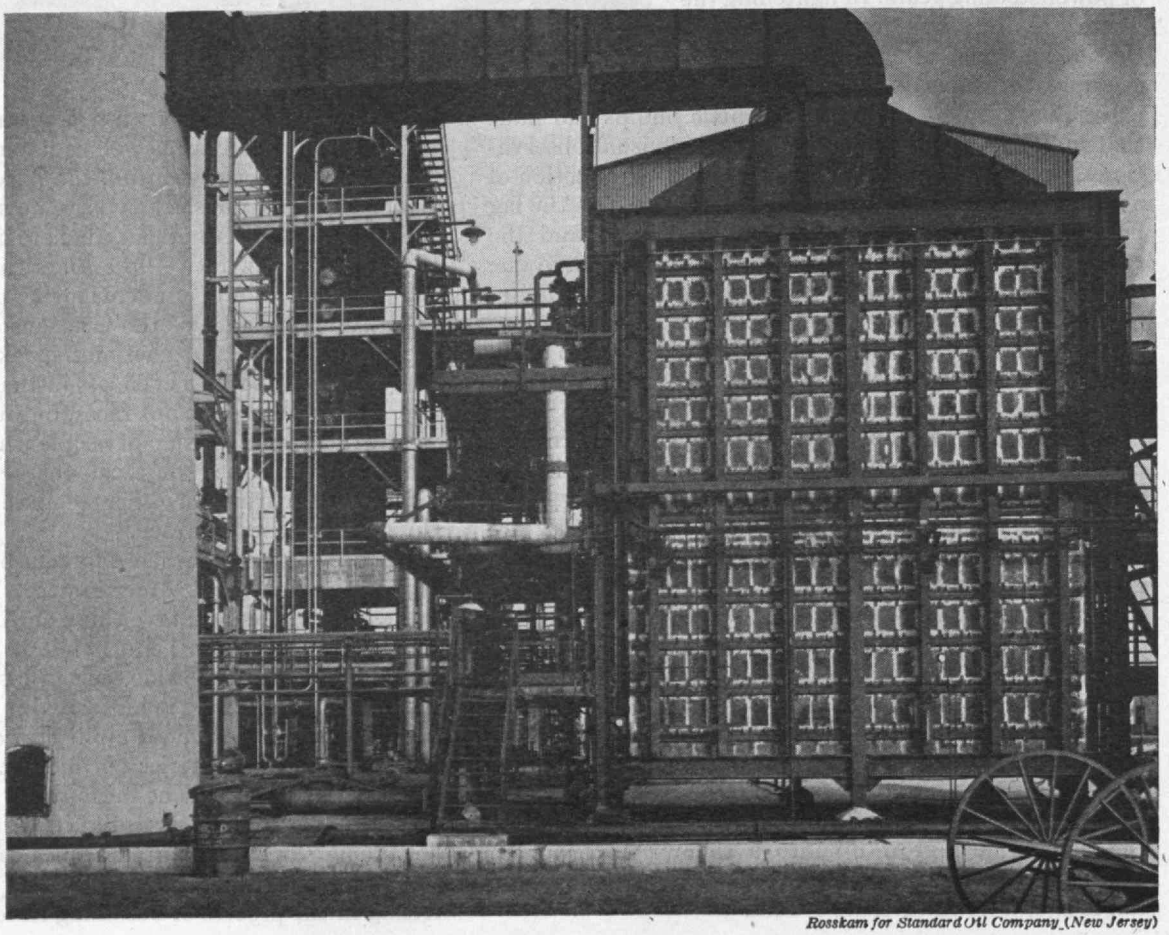
His investigation, which he conducted for the United States Immigration Commission, showed that American-born descendants of immigrants differ in type from their foreign-born parents. Boas found, for one thing, that the American-born descendants differ from their immigrant parents in head form, but that the direction of the difference varies with the group. Among eastern European Jews, for example, the head tends to be rather broad; their American-born offspring develop a slightly narrower head, and in the second generation it becomes even more narrow. On the other hand, the American-born offspring of the narrower-headed Italians develop heads broader than those of their parents.

These differences develop in early childhood and persist throughout life. The head form of the foreign-born parents remains unaltered no matter how young or old they were at the time of immigration. Interestingly enough it was found that the influence of the American environment makes itself felt with increasing intensity, according to the time elapsed between the arrival of the mother and the birth of the child. That is to say, the greater the interval between the arrival of the mother in this country and the birth of her children, the greater the difference in the shape of the head of those children. The differences between immigrants and *their own* European-born children were found to be, as would be expected, always less than those between them and their own American-born children.

Other changes were disclosed in addition to those in the form or shape of the head. For example, the width of face of American-born children of immigrants was found to be decidedly narrower than that of the foreign born. And the later the birth of the child after the immigration of the mother, the narrower was its face. In 1935 Boas showed that this change is proceeding in immigrants themselves, the later immigrants having narrower faces than the earlier. This change occurs not as a result of their living in America, but is in process of being established before they ever arrive on these shores. What the cause of this trend may be we do not know.

A similar investigation on new sets of immigrants and their offspring, conducted by Boas in 1937, yielded precisely the same results as his investigation of a quarter of a century earlier.

Now what do such findings mean? Do they mean that different European types tend to become the same the



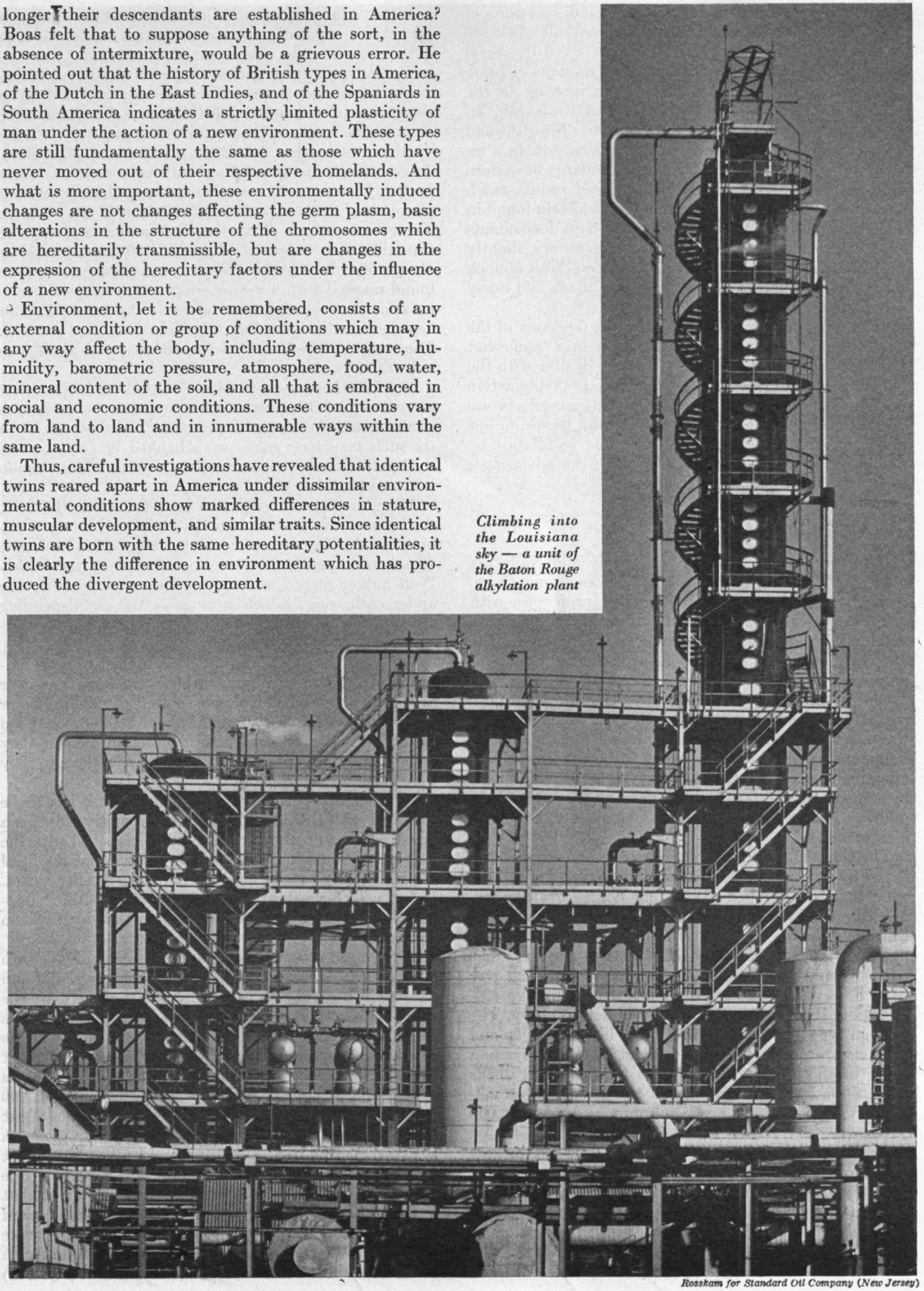
The furnace of a low-pressure petroleum cracking plant in Baton Rouge

Rosskam for Standard Oil Company (New Jersey)

longer their descendants are established in America? Boas felt that to suppose anything of the sort, in the absence of intermixture, would be a grievous error. He pointed out that the history of British types in America, of the Dutch in the East Indies, and of the Spaniards in South America indicates a strictly limited plasticity of man under the action of a new environment. These types are still fundamentally the same as those which have never moved out of their respective homelands. And what is more important, these environmentally induced changes are not changes affecting the germ plasm, basic alterations in the structure of the chromosomes which are hereditarily transmissible, but are changes in the expression of the hereditary factors under the influence of a new environment.

Environment, let it be remembered, consists of any external condition or group of conditions which may in any way affect the body, including temperature, humidity, barometric pressure, atmosphere, food, water, mineral content of the soil, and all that is embraced in social and economic conditions. These conditions vary from land to land and in innumerable ways within the same land.

Thus, careful investigations have revealed that identical twins reared apart in America under dissimilar environmental conditions show marked differences in stature, muscular development, and similar traits. Since identical twins are born with the same hereditary potentialities, it is clearly the difference in environment which has produced the divergent development.



Climbing into the Louisiana sky — a unit of the Baton Rouge alkylation plant

Rosskam for Standard Oil Company (New Jersey)

Such changes as Boas described in the descendants of immigrants in America are taking place all over the world. For example, H. L. Shapiro has recently shown that first-generation Hawaiian-born descendants of Japanese immigrants to Hawaii exhibit an increase in the breadth of the head and a decrease in its length, an increase in stature and a decrease in nose breadth, and so on for many other characters. W. Dornfeldt, in a recent study of the first-generation descendants of eastern European Jews living in Berlin, obtained results much the same as those of Boas. Marcus S. Goldstein found in 1943 that the first-generation American-born descendants of Mexican immigrants, while showing a very slightly narrower head than that of their parents, exhibit a much narrower face, narrower nose, greater stature, and many other similar changes.

It may be perceived then that in this tendency of the descendants of immigrants to develop in a somewhat modified way from their parents, we are dealing with the effect of environmental forces which are probably active upon men everywhere. Precisely how those effects are exerted and what their exact nature may be we do not know, but a good way to find out would be to start by making available to people everywhere the advantages of an adequate standard of living.

A Dictionary of Rockets

ALTHOUGH the United States Army and Navy are now spending over $100,000,000 each month on rocket weapons and have used rocket projectiles with great success in many parts of the world, the Germans still hold the edge in the number of types employed. The known American rocket weapons at present in use are of only a few types.

One is the famous bazooka, the well-known antitank rocket. Another one is the 4.5-inch type which carries a war head of about the same explosive force as a 155-millimeter shell and which seems to be used mostly in amphibious operations. The third type is the rocket used by American fighter planes, presumably somewhere midway in size between the bazooka shell and the 4.5-inch rocket.

The German rocket weapon which became known first is the by now rather familiar six-barreled rocket mortar which has been dubbed "Whistling Willie" or "Screaming Minnie" by American soldiers but which is officially called *Nebelwerfer 41*. The term means "smoke thrower, model 1941" and indicates that this weapon was originally evolved as a chemical mortar although it has never been observed to fire anything but high-explosive ammunition. It is used in the manner of field artillery. The original type had six barrels arranged like a hexagon and fired electrically at one-second intervals. The projection tubes of this type are about five feet long, the shells almost five feet. The diameter of this rocket is 150 millimeters, and it attains a maximum range of about 6,000 yards.

The more recent *Nebelwerfer* of larger type fires rockets with a diameter of 210 millimeters to a maximum range of 9,000 yards. These projectiles not only are larger in size but also differ in construction, the propellant being placed behind the high-explosive charge; in the smaller type the positions are reversed. The projector for the larger rockets comes in many shapes: as a five-cornered polygon, as a hexagon, or as just five tubes mounted side by side. Occasionally 10-tube projectors, with two rows of five placed in two tiers, have been captured.

The 210-millimeter rocket proper of the larger *Nebelwerfer* is utilized as propulsive element in the heavier projectiles of a weapon called *Schweres Wurfgerät*. The name, which means "heavy throwing engine," is a revival of the medieval German term for siege engines. Aside from its historic and semantic connotations, it was probably meant to be a screening name which would not permit any deduction about the nature of the weapon. These rockets look somewhat like enormous clubs; the 280-millimeter type weighs about 180 pounds and is always filled with high explosive (even though some were found marked with a yellow cross, which is the German notation for mustard gas), whereas the 320-millimeter type is incendiary, holding 11 gallons of oil and gasoline. The range of which the *Schweres Wurfgerät* is capable is only 2,000 yards.

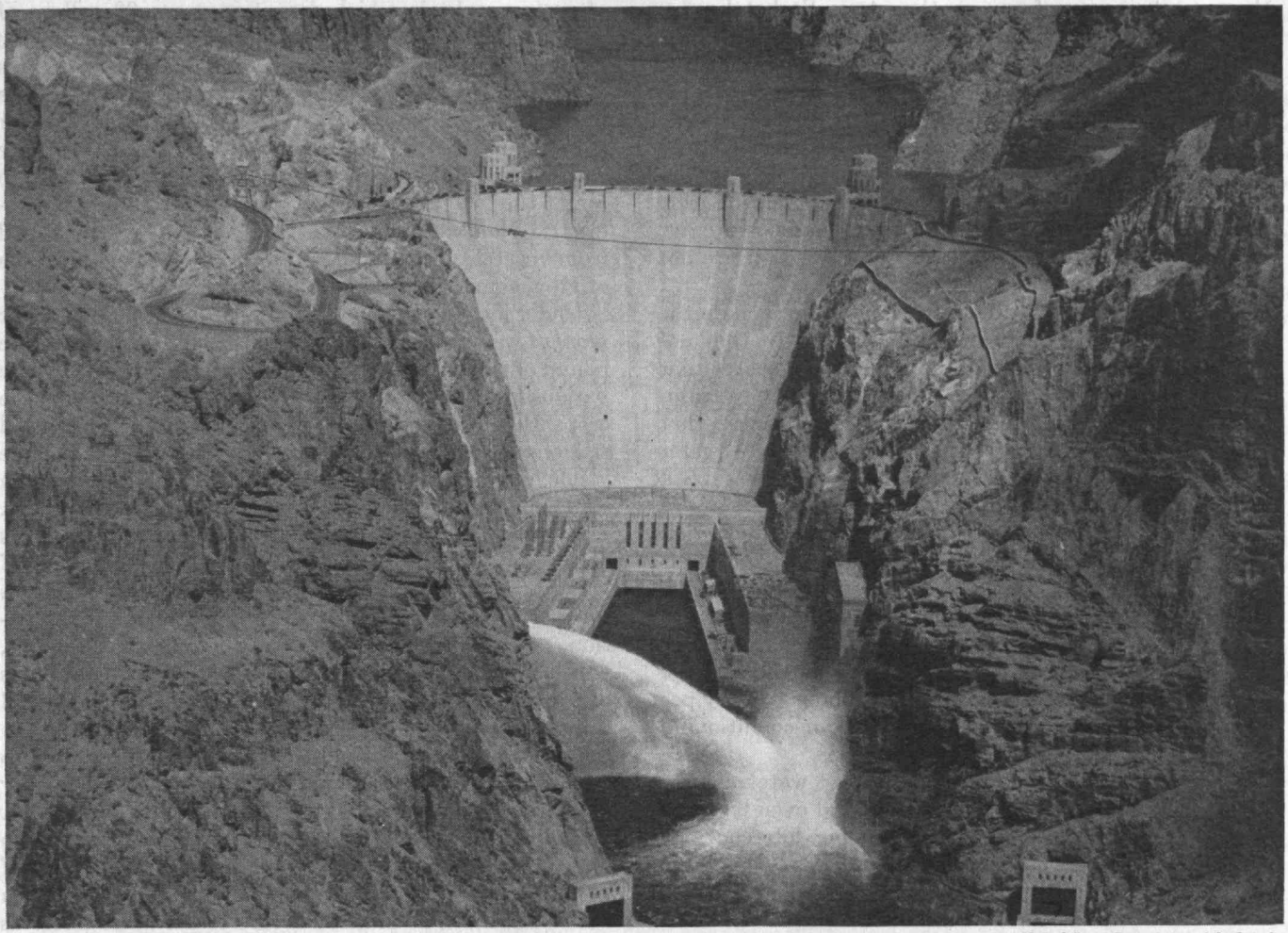
At first these rockets came in packing crates that served as launching racks after the outer covering was removed and the crate was propped up at one end. Then six such launching racks were banked in two rows of three and mounted on an artillery carriage. The weapon is not an effective one.

After the American bazooka proved itself in the field, the Germans produced a bazooka of their own, on a much bigger scale. The diameter is either 80 or 88 millimeters. This is presumably the same rocket used by the Focke-Wulf fighter planes, which carry two such rockets, one under each wing. Effective range in the air, depending on conditions, is from 1,000 to about 1,500 yards maximum.

The German antiaircraft rockets seem to be an imitation of the British Z guns, firing rockets carrying war heads of about the explosive power of 88-millimeter shells to an effective altitude of about 20,000 feet. Used originally in heavy concentration around Berlin, they have figured less prominently recently, although they were encountered in many places.

Whether the German winged rocket bomb has to be classified with those weapons whose propulsive force is a powder rocket or whether it should be classified with the long-range liquid-fuel rocket, V-2, is somewhat doubtful at present, but it seems more likely to be a powder rocket. It was used for a short time, mainly against Allied shipping, being carried to the scene of action by German bombers.

The winged rocket bomb has often been confused with V-1 because of their general resemblance in shape and because V-1 can also be carried by bombers. Actually the winged rocket bomb is smaller than V-1. Moreover, it is rocket propelled, whereas V-1 is jet propelled. V-1 is capable of long range; the rocket bomb is not. The rocket bomb is radio controlled (to a certain extent); V-1 has a robot pilot. The rocket bomb weighed around 1,700 pounds, was 10 feet long, and had a wingspread of about 10 feet. After being released from its carrier plane (a Focke-Wulf 200, Heinkel 177, or Junkers 290) the rocket unit burned for a fairly short time, converting the glide into a power dive. The carrier plane could direct that power dive somewhat by remote control of rudder and tail surfaces. As a rule these bombs were not too accurate but scored a few hits. Use of them was abandoned even before the invasion. (*Concluded on page 270*)



United States Department of the Interior

The Limiting Resource

The Most Heavily Used Material of Production, Water Determines the Conditions of Man's Living

By Paul Cohen

PASSING roughly through the middle of Texas, Kansas, Nebraska, and the Dakotas is the 100th meridian of longitude, cutting the land area of continental United States into two almost equal portions. To the west lie great stretches of mountains, deserts, and high plains which, except for a few regions fringing the Pacific Ocean and a sprinkling of moderate-sized cities elsewhere, have stubbornly remained wide-open spaces. Nevada, the extreme case, possesses one square mile of territory for each of its inhabitants. California, the most thickly inhabited state in this area, achieves a population density just about equaling the *average* for the United States as a whole. To the east of the line, in an area only a few per cent larger, lives about 87 per cent of the country's population. From the crowded East rather than the vast expanses of the West comes the bulk of our livestock, farm products, mineral output, and industrial strength. Much of the West is too mountainous or cold to support large populations, but much also is capped with rich soils and dotted with useful mineral deposits. The dominating reason for the differences in the suitability of these regions for concentrated human habitation is the fact that to the east of a line approximately coincident with the 100th meridian, the yearly rainfall in general exceeds 20 inches. To the west, except in the high mountains or near the Pacific Coast, it is under 20 inches a year, frequently considerably under. Furthermore, the rainfall is distributed over the seasons in such a manner and varies so widely from year to year that even dry farming, which in the cooler regions might be managed on 15 inches of rain, is rendered a precarious or impossible occupation. A recent example of what this can mean, and one with a happier ending

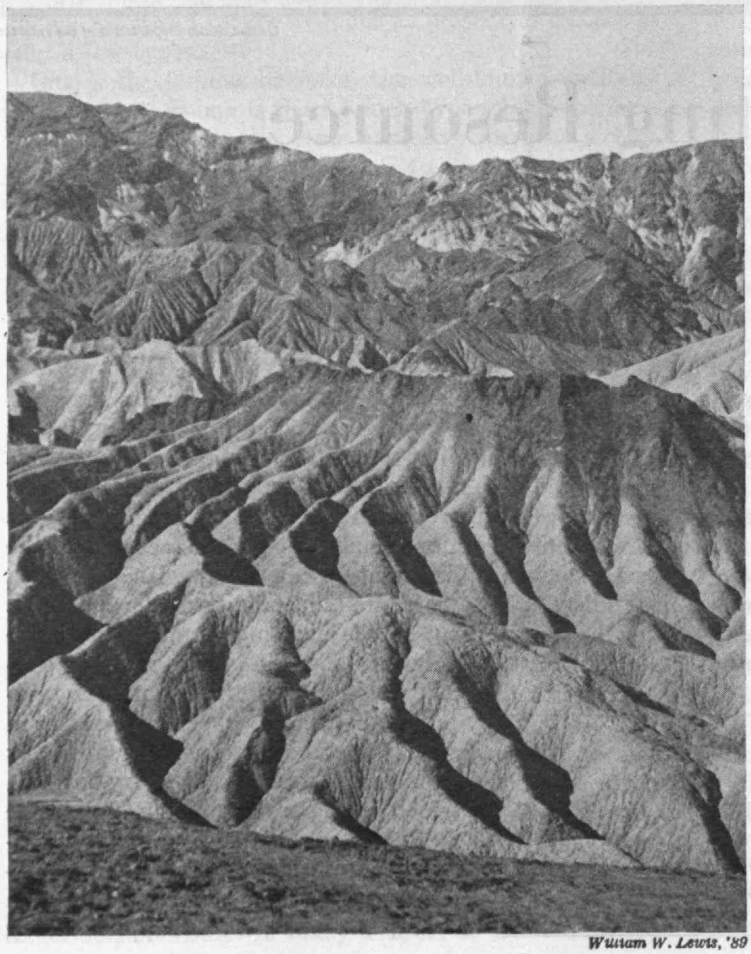
Above:
Boulder Dam, the world's highest, 726.4 feet from lowest point to crest, can hold 30,500,000 acre-feet of water in Lake Mead.

than most, comes from southwestern Saskatchewan, climatically a part of this region. After attempts to raise wheat without water had finally ended in ruin and tears, the government is rehabilitating the area by returning most of the land to pasture, building irrigation projects, and moving displaced farmers to more promising lands. Throughout more than a third of the land area of continental United States, rainfall must be supplemented by irrigation to permit farming on a secure basis. We have, in the West, 11 literally dry states and five that are not exactly soaking wet.

To the inhabitants of humid regions, who include the great majority of Americans, it is strange to think of water as a resource — in fact, as a limiting resource that controls the productivity of the land, its ability to maintain dense populations, and all the consequences that follow. Even in the regions of greatest abundance, water is the most heavily used material of production. We speak with pride of our output of fuels, which is in the order of 10,000 pounds per capita per year, and of the production of steel which, in a war year, is exceeding 1,200 pounds per capita per year. In New York City, however, the public water systems supply on the average about 125 gallons, or about 1,000 pounds, of water per capita per day. This is not an exceptional figure, for the average among American cities is close to 100 gallons per day per person, and hot-weather peaks, with air-conditioning systems going full blast, far exceed it.

When it comes to the industrial uses of water, figures vary widely from industry to industry and even between plants in the same industry. It makes a big difference, for example, whether a wool-scouring plant discards the water after one cycle, in which case it may use 20 gallons of water per pound of wool, or whether it recirculates the fluid, using perhaps one gallon per pound of wool. Figures of 80 tons of water per ton of steel produced, 236 gallons of water per gallon of alcohol, and 1,000 gallons of water per pound of fine rag paper have been quoted. To consider water consumption only in such terms, however, is to forget the Niagaras that flow through steam and hydroelectric plants and the Mississippis that are transpired from vegetation or evaporated from the soil in the process of growing our food.

Under ideal conditions, something like 1,000 pounds or more of water must be applied to the land to produce one pound of marketable wheat. Under field conditions, where various losses occur during the application of water to the crops, the ratio mounts still higher; tests on experimental stations in our arid West have shown that, for average yields, more than 3,000 pounds of irrigation and rain water must reach the land to produce a pound of wheat. For alfalfa, one of the most important products in terms of acreage of our irrigated lands, about 1,800 pounds of water per pound of alfalfa are required. And these figures take no account of the losses from seepage and evaporation, often half of the water drawn from the reservoir, which occur before the farm is reached. Under conditions of natural rainfall, with a considerable fraction of the fall taking place outside the growing season or at a time when the plant cannot make most efficient use of it, the ratio between water and useful output, particularly when only a small part of the plant is used, becomes prodigious. Wasteful or not, nature frequently circulates close to two tons of water for every pound of wheat harvested. If these figures are impressive, consider a jungle which can return as much moisture to the atmosphere as can a free water surface, i.e., up to 80 inches a year in hot, arid climates. One inch of rain falling on one acre represents a weight of 226,500 pounds.



William W. Lewis, '89

Over great stretches of the earth, the rate at which water is evaporated so far exceeds the rate at which it falls that we have what are called arid and semiarid climates. Every traveler knows the characteristics — browned, treeless, harshly outlined landscapes, the raw earth showing between scrawny clumps of vegetation. Except for the lack of water, conditions are frequently ideal for agriculture: The dryness hinders the leaching out of valuable minerals from the soil, insects and pests are relatively few, and the many clear, sunny days favor plant growth so that, in the United States, the output from irrigated cropland is about twice the average for the country as a whole. Without supplementary water, virtually the only stable way for persons to live in an arid land, whether it be Arabia or Wyoming, is by stock raising, which demands an enormous acreage per family. An extreme example is the amount of land required, according to the Department of the Interior, to support *one* head of cattle in Arizona — 320 acres. With irrigation, however, tracts of less than 100 acres can often support a family on an American standard of living.

The land under irrigation throughout the world is estimated at about 200,000,000 acres. A tenth of that acreage is in our West, and from it, directly or indirectly, comes the support for perhaps half the population west of the 100th meridian. In most

western states, irrigated lands are assessed at from 10 to 15 times the rate for nonirrigated but equally rich soil lying near by. Representing about 3 per cent of the area of the arid and semiarid lands, these irrigated tracts, in addition to their other crops, furnish a large portion of the winter feed for the livestock of the West, make communication and transportation far more practical than they would be if the West were an empty waste, and increase wealth and living standards of these areas in ways too numerous and complex to describe.

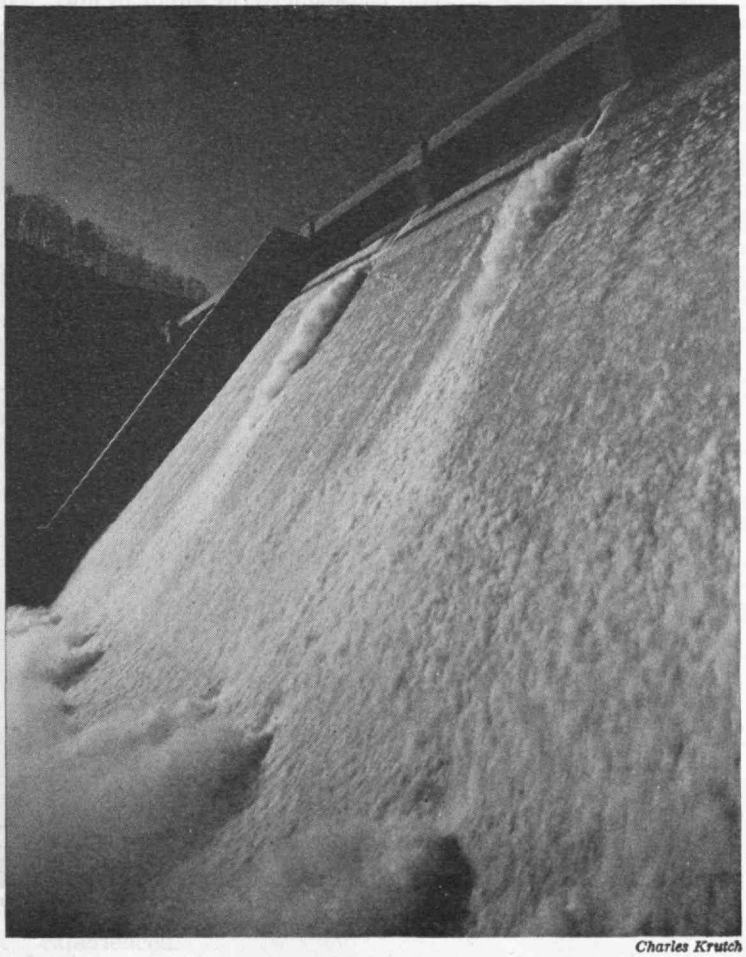
To our lavishly endowed country, all this may still be a relatively minor matter, for irrigated land represents about 6 per cent of the land under crops. But to densely populated and largely agricultural countries such as India and China, irrigation is a process on quite another plane. India cultivates some 55,000,000 acres with the aid of irrigation, 20 per cent of the land producing crops or lying fallow. In China, "irrigation is everywhere . . . an indispensable condition for intensive agriculture, on the basis of which Chinese agrarian society has been constructed, just as the industrial society of modern capitalism has been constructed on the basis of coal and iron." In Egypt and India, irrigation is the "very condition of existence both of the government and the people."

While irrigation in India has been greatly aided by large modern structures such as the Lloyd Barrage and the Mettur Dam, which have undoubtedly been factors in supporting the tremendous increase in population now occurring in that country (a growth of more than 50,000,000 people between 1931 and 1943), this method of farming has been practiced there since antiquity. Moreover, the early civilizations of the Nile and Euphrates valleys were based on large-scale irrigation, and in Egypt the systems have remained in operation for thousands of years.[1]

As reports of giant dams and canals have accumulated over the past few decades, it is hard to escape the impression that if irrigation is an old art, its horizons have lately been greatly expanded. Limited to the use of human or animal muscles, which in any age are wildly expensive in terms of work accomplished when compared with energy derived from mineral fuels, and lacking the resources of present-day technology, the ancients could irrigate only under favorable conditions. The topography had to be such that the water would flow to the croplands under gravity (areas that were "under the ditch") or with relatively small lifts. With higher lifts or deep wells it was too easy to get into a vicious circle whereby a given area of land could not support the men or animals needed to furnish it with water. Where hand labor prevails, it is rarely possible to afford heavy and continuous energy expenditures above the normal requirements of agriculture. Assuming an average intake of 3,500 calories per day per capita, Pei-sung Tang has estimated that the Chinese farmer expends 91,000 calories in cultivating an acre of winter wheat. An American farmer expends 4,200 calories, not counting the fuel which he burns to drive his equipment. The American may obtain from the food he harvests 200 to 500 times more energy than he expended. For the Chinese, the ratio is from seven to 25 times.

In north China, where the pressure of population is about as intense and the value of human labor about as low as anywhere in the world, irrigation is sometimes practiced with muscle-powered pumps from wells 30 feet deep, although even here, previous to the Japanese invasion, engine-driven pumps were proving themselves competitive on lifts of more than eight feet. In America, pumping from 30-foot wells for irrigation purposes is economical in such regions as Kansas; and when intensive agriculture is practiced near large centers of population, as in California, efficient engine-driven pumps make it feasible to lift water 300 feet.

Since arid regions almost invariably have far more potentially productive land than water with which to cultivate it, the most effective use of existing supplies requires that the water of the peak flows, following the rainy season or the melting of snows, be impounded for use later in the year. Perfectly aware of this fact, peoples in less technically advanced stages than our own have been building storage dams for centuries, but they have not had the means to build the huge structures, the great pumping plants, and the hundreds of miles of canals that mark the irrigation projects of today. More characteristic are the small pools or "tanks" which dot the hilly sections of India and store water and malarial mosquitoes for the dry spells. Only those who are equipped with power drills and explosives can afford the trick of diverting water from one watershed which has more than it can profitably use to another which has more irrigable land than water. Thus, in Colorado, the waters of (*Continued on page 264*)



Charles Krutch

[1] Under government management, incidentally. In Egypt the principal irrigation works have been built and maintained by the central authorities since the days of the Pharaohs, and in China at least since the Sixth Century before Christ.

The Magnesium Prospect

An Important Period of Transition and Testing Lies Ahead; Requirements Five Years Hence Are a Question

By Arthur Lowery

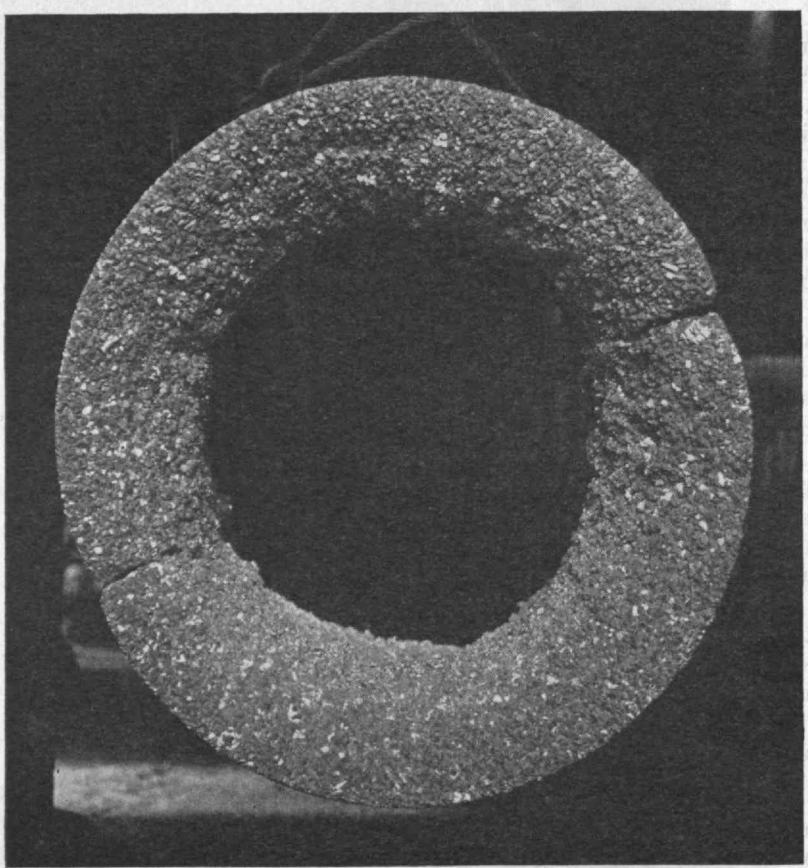
II

IN the private-enterprise environment of this country technical research, market development, and sales volume are tied up in a three-way chicken-and-egg relation. Extended research and aggressive marketing are necessary to expand sales, but both require financing, which sooner or later must come out of sales revenue. Before the war this was a vicious circle for magnesium, keeping it a pygmy operation compared with its common competitors such as steel, aluminum, copper.

Some figures indicate just how much of a pygmy prewar magnesium really was. According to information submitted to the Truman Committee of the United States Senate last March by the Dow Chemical Company, the only domestic magnesium producer of any consequence before 1942, its total domestic ingot *sales* in the fiscal year 1939 grossed about $380,000 on a total of some 1,850,000 pounds, or 900 tons. In the same year its *production* of magnesium was about 6,600,000 pounds, or 3,300 tons; aluminum production was something over 200,000 tons, copper production over 1,000,000 tons, and steel production approximately 52,800,000 tons.

In the same statement Dow showed total domestic sales of magnesium ingot from the beginning, before 1920, on through May 31, 1939, grossing only approximately $11,000,000 for some 35,000,000 pounds. Total service, development, sales, and administrative expense for the same period was indicated at about $1,700,000, and investment in facilities used both directly and indirectly in magnesium metal production less than $7,000,000. When these figures are compared with the hundreds of millions involved in each competitor metal, the problems of the research-marketing-sales circle for magnesium are forcefully spotlighted. Advertising and marketing were, and evidently had to be, restricted to a laboratory approach to a limited variety of applications. Magnesium was a specialty product and was treated as such.

A look at the spectacular advertising of magnesium in the current popular and trade magazines shows how completely the war has broken the closed circle. The big two in promotion now have grown to the big three, as Revere Copper and Brass, Inc., with a nation-wide sales staff and promotion campaign, steps in alongside Dow and the American Magnesium Corporation. Other smaller fabricators, foundries particularly, are adding their bit of publicity as a result of their war induction into the business. By reason of greater confidence in war-inspired technology, increased profits, income tax provisions, more competition within the industry, and the pressure of enlarged plants which must be kept in operation, the development of the sales of magnesium is reaching new heights both in amount and in variety.



Permanente Metals Corporation

A ring of carbothermic magnesium crystals

Magnesium is facing an extremely important transition and testing period. The day of easy generalities and glowing predictions is passing. Costs are going down, and technology is rapidly improving. But the same can be said of many competing materials. Large investments of both time and money now must be devoted to specific applications and actual service testing in those applications, often with little to show for the effort. The necessary development engineering is under way in many fields, from busses, trucks, and wheelbarrows to furniture, baby carriages, and strollers. The inherent structure and characteristics of magnesium make it more complex metallurgically than aluminum, copper, or iron, so that progress in developing its potentialities is not likely to be sudden or revolutionary.

Machining, gauging, and waxing magnesium warp beams

American Magnesium Corporation

For some 18 months a surplus of magnesium metal has been growing. However, the capacity in various fabricated products has exceeded the military demands only since mid-1944. Early last October, the War Production Board removed all allocation control from magnesium and its products, but the newness of this "new freedom" was more apparent than real. For more than a year before allocation was removed, the War Production Board turned down no request for magnesium products for any use except when the fabricating capacity was wholly necessary for war needs. In the first six months of 1944 over 175 new uses, including many civilian items, were approved and tried.

The armed services and the War Production Board actively have encouraged new military applications as rapidly as production capacity, design engineering time, and experienced subcontractors have become available. The results have been various, exceeding expectations in some cases and proving disappointing in others. These experiences of the past year show that each new use for magnesium must be judged on its own merits.

Hovering over the thoughts of postwar producers of the metal is the unknown impact of the tremendous surplus of magnesium. In addition to the great store of ingot that will be available, the war's end will see the appearance of some 25,000,000 to 50,000,000 pounds more metal from fabricators' inventories, from stocks and parts in process, and from scrap and salvage of magnesium components on military equipment declared surplus or obsolete. If the supply is dumped on the market at reduced prices, the producers might have to close up their plants for a period of years. Magnesium ingot, especially if it is of high purity and properly stored, can be held for a substantial period of years. In fact a Canadian metal producer has been "storing" his ingots merely by stacking them up in piles outdoors, with no protection, and he claims they are entirely satisfactory. Given clean, dry storage, much of our surplus inventory might well be retained as a strategic military stock pile and thus not interfere with the continued development of magnesium production and technology. It is to be hoped that our metal producers will not have to sit back doing nothing while the more recent producers in other countries are growing and are developing new and more efficient production techniques.

The handling of the surplus will be especially significant in the case of the Dow Chemical Company. Its magnesium metal production is integrated with the production of many other chemical lines, in both its Michigan and Texas plants. When a balanced production relation can be maintained, the company's costs for any one product are favorable. In magnesium, because of this spreading of joint costs, Dow may again be the dominant, low-cost metal producer after the war. On the other hand, if its sales for one group of products change violently, its production balance is upset and costs go up.

The price of the metal through most of the war has been 20.5 cents a pound, delivered in carload quantities. There is reason to believe that a postwar reduction in this price is feasible, but the price is not apt to go below 15 or 16 cents for some years to come. The 20.5-cent price makes magnesium cheaper, volume for volume, than the present 15-cent aluminum.

Price of the metal is only part of the story. The man who buys a wheelbarrow or bus is interested in the price of the fabricated product. The spread between metal price and fabricated price, even on a volume basis, is usually greater for magnesium than for aluminum. As long as magnesium remained a specialty item, a few cents' difference in cost was found not to affect sales appreciably. Now that it is being groomed for mass markets, price becomes more important.

Current prices for magnesium alloy aircraft castings average $1.50 to $2.00 a pound, and for similar aluminum alloy castings 75 cents to $1.25 a pound. The general run of postwar castings will cost much less, perhaps 75 cents to $1.50 a pound for magnesium, and 40 to 90 cents a pound for aluminum. The requirements will be less intricate, inspection standards less rigid, competition more intense, technique more established, and labor more experienced.

American Magnesium Corporation

Torch welding a magnesium aircraft oil tank

Magnesium sand castings are likely to continue slightly more expensive on both pound and piece bases. Because of the metal's lightness in weight and its great chemical activity, foundry practice must continue for some time to be more complicated than for other metals. This fact makes not only for higher production costs but also for greater rejects. One of the postwar bright spots is magnesium die castings, the properties of which are comparable to those of aluminum and the cost of which also will likely be as low as that of either aluminum or zinc die castings.

The prices of wrought products can be analyzed in a similar fashion. Prices of various sizes of aircraft sheet in magnesium alloys range from 55 to 85 cents a pound, and in aluminum alloys from 25 to 35 cents a pound. The comparison for extrusions and forgings is more favorable to magnesium. The extra cost of magnesium wrought products is explained partly by more complicated fabrication practice but largely by the relatively small sales volume and the consequent small-scale production methods. For instance, the manufacture of aluminum sheet, plate, and strip has run as high as 95,000,000 pounds a month, while that of magnesium sheet, plate, and strip has ranged little higher than 300,000 pounds a month at peak. There is obviously much opportunity for reducing the price of magnesium products provided the volume can be greatly stepped up. However, any great increase in volume will require new plants, and the present postwar prospect for magnesium sheet does not seem to justify investment of much private capital in such plants.

These facts indicate that the chances are small for magnesium to enter postwar competition with other metals on purely an original cost basis. It must rely on its special qualifications, particularly its light weight and the reduced operating cost or increased pay load resulting therefrom. For example, air lines have estimated the saving of a pound of weight to be worth from $250 to $1,000 over the life of an airplane.

The railroads also talk about saving weight, and sometimes state that a pound of weight saved is worth 10 cents in freight cars and $1.00 in passenger cars. Yet the railroads are not as yet making many definite moves toward magnesium. One typewriter manufacturer is willing to pay $5.00 to lighten his machine, while another says if his machine is made any lighter it will move around too much while being operated. A magnesium wheelbarrow may increase the daily load carried by one-fifth and therefore be eagerly sought by one contractor, whereas another might point out that the daily work performed by his men is pre-arranged with their union and that a light wheelbarrow would interest him not at all. The data now available are not extensive, and a period of trial and service test is necessary before any general conclusions are reached.

Magnesium's postwar career is more dependent upon the fabricators than on the metal producers. The big expansion must come in the sales of fabricated products, and there is more need for technical development and lowered cost in fabrication and product engineering than in metal production. The number of fabricators has jumped from a pre-war dozen to over 60, most of whom seem determined to stay in the magnesium business. It is not without significance, however, that a few among them are planning to discontinue magnesium after the war. Many of the fabricators, together with some of the producers and smelters, enthusiastically have inaugurated a trade organization, the Magnesium Association. This group has got off to a good start and can be quite useful in many ways. It can provide a common meeting ground enabling the several parts of the industry to keep abreast of each other's problems; it can move toward standardization of alloy designations and specifications; it can provide information to its members and the public.

Any forecast of magnesium's future based on historical trends is dangerous. The figures before the war are too small to be statistically pertinent, and war conditions are obviously too artificial to be used. In time of war, weight-saving is reckoned in terms of lives and often is achieved at immense monetary cost, but in time of peace it is balanced sternly against dollars, or the customer's willingness to pay. The measure of wartime structural use of magnesium therefore cannot be directly applied to indicate its peacetime commercial future.

Using a rough national income approach, let us assume a $140,000,000,000 income in, say, 1949. In 1939 the national income was $70,647,000,000 and total domestic sales of magnesium ingot were approximately 1,850,000 pounds. On this basis sales for 1949 would be 2,340,000 pounds, a rather bleak prospect for a 600,000,000-pound capacity. Worse yet, if the downward trend from 2,035,000 pounds in 1936 to 1,850,000 pounds in 1939 is followed, 1949 totters along with a mere 1,220,000 pounds. These figures are ridiculous of course, but they illustrate the impossibility of locating a firm statistical basis for estimates. (*Continued on page 248*)

America's Last Superliner

The Adriatic *of the Collins Line Set a High Mark in Atlantic Luxury in the Mid-Nineteenth Century*

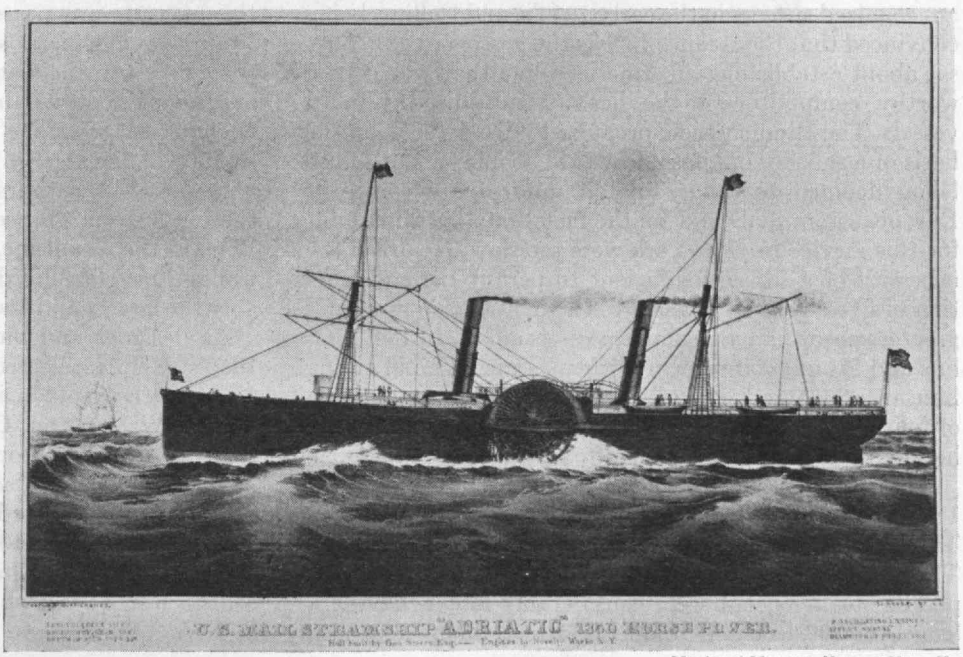
By W. Mack Angas

BY current standards the Collins liner *Adriatic* could by no stretch of the imagination be called a "superliner." A fair definition of this term today is: a vessel of over 50,000 tons' displacement capable of maintaining a speed of at least 28 knots on a north Atlantic passage. But words and phrases change their meanings, and a broader and more generally applicable definition of the term "superliner" might well be: any vessel designed and built to be the largest and fastest seagoing passenger vessel afloat or to approximate the size and speed of the vessel currently acknowledged to be the largest and fastest liner in the world. By such definition, the American merchant marine once boasted a fleet of superliners, the vessels of the Collins Line, which, in the early 1850's, were unquestionably the most popular steamers operating on the north Atlantic. Last, largest, and fastest of the Collins liners was the ill-fated *Adriatic*.

It is significant that the brilliant years of the Collins Line were contemporaneous with those of the clipper ship era, the golden age of the United States merchant marine, when Americans were vitally interested in sea-borne commerce and proud of the position of their country as the world's leading maritime nation. It is also significant that the Collins Line was forced to suspend operations and go out of business during the twilight years of the clipper ship, when the interests of the United States were naturally turning to the development of the West rather than to the further development or even the maintenance of sea-borne commerce.

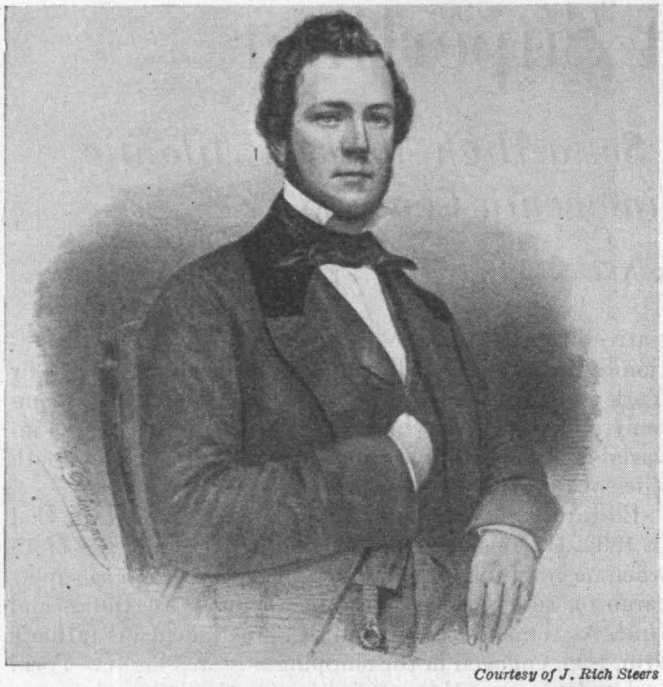
The inception and organization of most large enterprises are usually known to be due to the energy and initiative of an outstanding individual. In general recognition of the fact that Edward K. Collins founded the New York and Liverpool United States Mail Steamship Company and was its moving spirit, the organization was invariably known to the press and public alike, on both sides of the Atlantic, as the Collins Line.

Edward Knight Collins was born in Truro on Cape Cod in 1802. His business career commenced at the age of 15 when he got a job in New York and later served as supercargo on sailing vessels trading to the West Indies and Gulf. At the age of 20, young Collins joined his father's firm, then engaged in the shipping business in New York, and a few years thereafter became the head of an organization of his own, E. K. Collins and Company, operating sailing vessels to Caribbean and Gulf ports. In the middle thirties, Collins won wide recognition as a daring and successful innovator in the shipping business by branching out from the West Indian and Gulf trade and entering the Liverpool service with a new type of sailing ship in which he and one of his most successful captains had great faith. The circumstance that Collins' firm owned the fine packet *Shakespeare* probably suggested naming the vessels of the new line for famous personages of the stage and calling it the Dramatic Line. New ships ordered for the Dramatic Line by Collins combined the fine lines of the Baltimore clippers with the flat bottoms and hard bilges required of the cotton packets built to enter the shallow harbors of the Gulf. Collins was sure that the resulting hybrids would possess the speed of the Baltimore clippers and, to a limited extent, the carrying capacity of the New Orleans cotton packets.



The Adriatic *as Currier and Ives portrayed her. Her 40-foot paddle wheels could drive her at 15 knots when the complicated valve gear of her 5,000-horsepower oscillating engines was favorably disposed.*

Mariners' Museum, Newport News, Va.



Courtesy of J. Rich Steers

George Steers, 1819–1856, designer and builder of the Adriatic *and better known as the designer of the yacht* America

On the other hand, old shipmasters and experienced sailors — among them Brown and Bell, who built the new Dramatic Line ships — were equally sure that such flat-bottomed monstrosities would inevitably be slow and incapable of going to windward well enough to make good westward passages across the Atlantic. When the ships went into service, however, the conservatives got a shock, for in November, 1837, the *Garrick* reached Cape Clear from New York in 12 days, and in 1839 the four Dramatic packets made 12 westward passages in an average time of 28 days, an improvement of 12 days over the 40-day average of the early Black Ball liners.

The Dramatic Line was unquestionably an immense success, but when the British began operating steamships in competition with his sailing packets, Collins was unwilling to rest on his laurels as operator of the finest sailing vessels on the north Atlantic. The Cunard Line became a recognized success in the early 1840's, and Collins, being convinced that the steamship was the vessel of the future, set about establishing an American line that would be a worthy competitor of the heavily subsidized Cunard vessels. The Bremen Line, organized in New York on the basis of a subsidy bill passed in 1845, Collins dismissed as being doomed to failure by an unfortunate choice of European terminals and by the fact that the ships built for this service in New York were too slow. He urged the necessity of a subsidy sufficient to permit the construction of five steamers of 2,000 tons, 1,000 horsepower, and greater speed than any similar vessels afloat. In 1847 Collins and his associates secured the passage of a bill giving him an annual subsidy of $385,000 for the construction of four ships of the type he had in mind, and accordingly he lost no time in setting about construction of them.

The Collins Line commenced operation on Apil 27, 1850, with the sailing from New York of the *Atlantic*. The *Pacific*, *Baltic*, and *Arctic* followed her into service. The ships, like those of the Cunard Line, were wooden paddle steamers, but were considerably larger, having a length of 300 feet and beam of 45 feet. They were also materially faster and more comfortable than Cunard ships and in consequence became at once the most popular steamers on the north Atlantic, not only with American but with British travelers. Captain McKinnon of the Royal Navy, upon returning from New York to England on the *Baltic*, after having made the passage to America on a Cunarder, admitted the superiority of the Collins liner in the following words: "I am only doing justice to these magnificent vessels in stating that they are beyond any competition the finest, fastest, and best sea boats in the world. I am sorry to be obliged to say this, but as a naval officer I feel bound in candor to admit their great superiority. Their extraordinary easiness in the sea cannot fail to excite the admiration of the sailor. I never beheld anything like it. No sea ever came on board, and there was no violent plunging; the steaming of the *Baltic* was the absolute poetry of motion. . . . The reason why we allow brother Jonathan to beat us on our own element is patent to the world, the British model is far inferior to the American."

The financial success of the line did not, however, match its popularity with the traveling public, and within two years Collins and his associates were in difficulties which could be solved only by a substantial increase in the line's subsidy. In 1852 Congress increased the subsidy to $33,000 a voyage with an annual limit of $858,000, but accompanied the increase with the disquieting proviso for a reduction to the original figure at any time after December 31, 1854, upon six months' advance notice.

This sword of Damocles over the head of the line did not impair the popularity engendered by the fast passages of the Collins ships, but the line was dealt a crushing blow when the *Arctic* collided with a small French steamer in September, 1854, and sank off Cape Race with an appalling loss of life. Among those who perished were Mrs. Collins, her daughter, and the younger Collins boy. At once there was a hue and cry blaming the accident on Collins' demand for fast passages, and for a time it seemed that Congress might immediately exercise its right to reduce the subsidy. In an attempt to forestall such action, proponents of the line introduced legislation insuring the continued payment of the subsidy provided the line complete an additional ship. After bitter debate this measure was passed by both House and Senate, but President Pierce, a stanch advocate of governmental economy, vetoed it and thus left the future of the line dependent upon its ability to keep in the good graces of Congress. During the critical period which followed the sinking of the *Arctic*, the Collins Line was undoubtedly helped by the withdrawal from the Atlantic of most of the Cunard ships for service as transports in the Crimean War. In the meantime, work was progressing on the new Collins liner *Adriatic*, designed and built to be unquestionably the largest and fastest steamer on the north Atlantic.

As designer and builder of his superliner of the late 1850's, Collins selected George Steers of New York. He could not have made a more fortunate choice. Steers was born in Washington, D. C., in 1819 and when little more than an infant was brought to New York by his father. The boyhood of young Steers was spent in New York, where his father was engaged in marine construction of various kinds. At the age of 10, Steers built his first boat, a scow, eight feet long. At the age of 16, he built the sailboat, *Martin Van Buren*, which made an enviable record racing in New York waters. At 18, he (*Continued on page 256*)

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

Homberg Memorial Infirmary

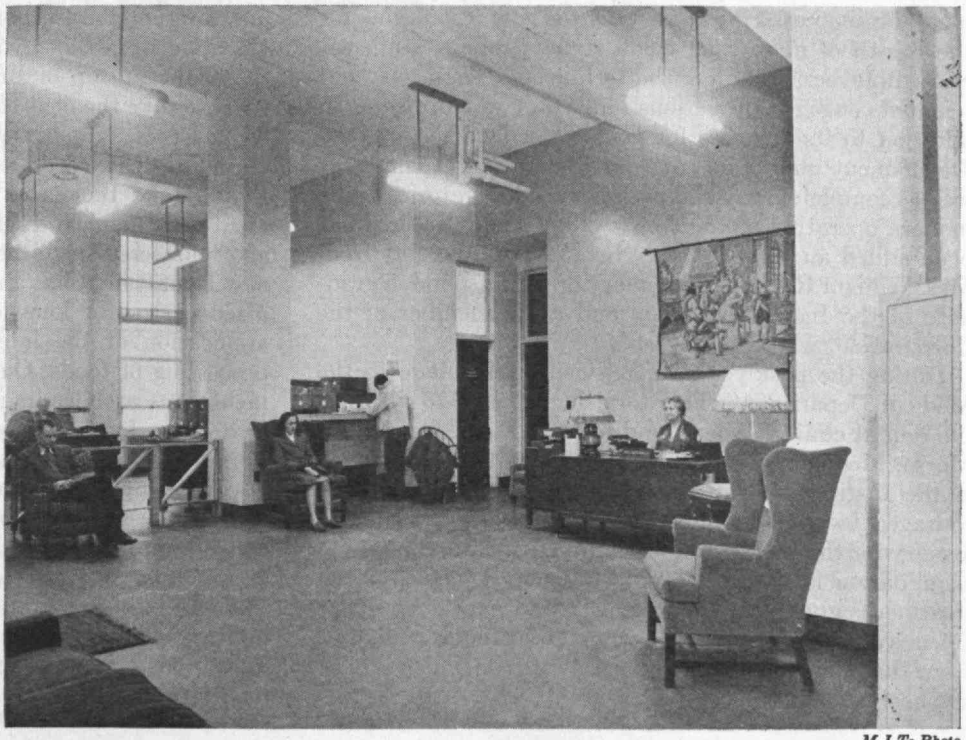
THE facilities of the Medical Department for safeguarding the health of students, staff, and employees at the Institute have been greatly improved by extensive remodeling of the Richard M. Homberg Memorial Infirmary, the capacity of which has been increased from 14 to 39 beds by more efficient use of existing space and the addition of an entire floor. The architect for the remodeling was Professor Lawrence B. Anderson, '30, who, before planning the alterations, made a thorough study of reports on national hospitalization requirements and of the specific needs of the Institute. The changes were designed to increase the capacity of the Infirmary, and one of the important objectives was to minimize as much as possible the atmosphere of a hospital.

On the first floor the old arrangement of three parallel corridors, which wasted space and divided the clinic into two parts, has been abandoned. The attractive waiting room has been brought to the center of the wing in its appropriate position at the entrance from the Homberg Memorial Lobby. This arrangement permits convenient access to all the clinic rooms. Along the right side and down the east corridor is grouped the sequence of treatment rooms, including quarters for the clinic doctor, first aid nurse, eye clinic, medical director, and dental department. Along the other, or west, corridor are a new pathology laboratory and the physical examination rooms. The latter have been enlarged so as to include within each room a dressing cubicle.

Between these two corridors and directly behind the receptionist's desk is a compactly planned block of central and essential service rooms which by their nature do not require daylight. A rest room and storage closets are among these facilities. Behind this block is the replanned x-ray suite, complete with a new and modern darkroom and every facility for a large volume of work. The x-ray room itself is so placed, with access from three sides, that it can be used with equal facility in connection with the physical examinations or with the clinical treatments. The third and widest door opens to the elevator lobby so that a bed patient can be brought to x-ray without passing through either of the first-floor corridors. Adjoining the waiting room on the west, the clerical office is placed so as to get natural light for its workers.

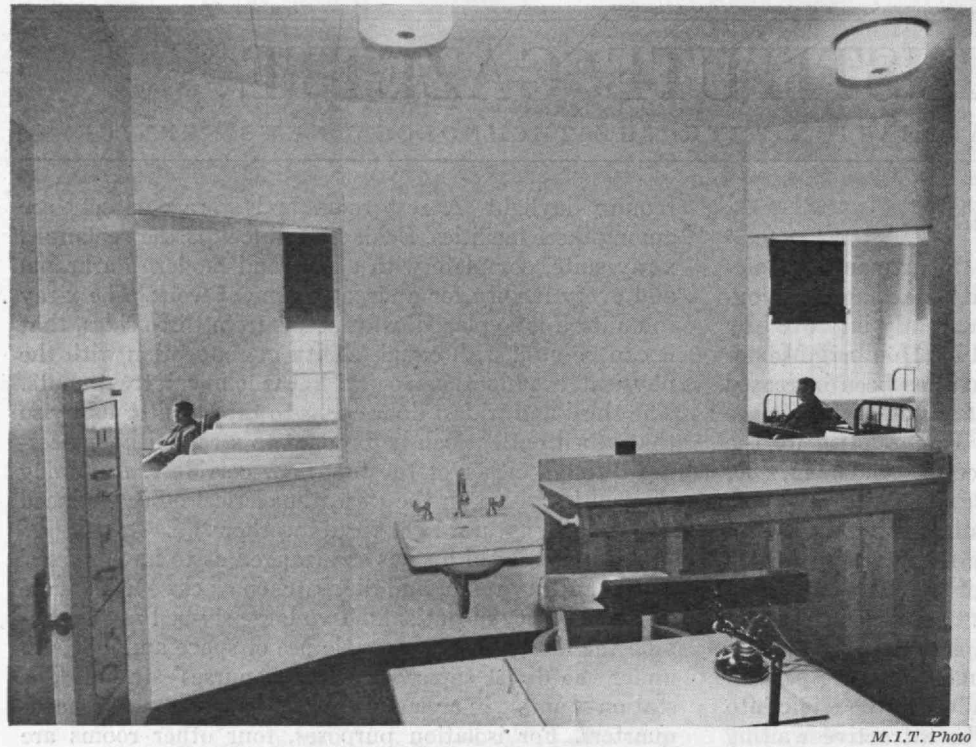
The new second floor is so arranged as to have nurses' station, utility room, and diet kitchen as close as possible to the majority of patients. Two large six-bed wards provide the most efficient possible use of space and are both under the direct supervision of the nurses' station. The station is ample in area and equipment to serve as a headquarters. For isolation purposes, four other rooms are provided, two of them private rooms and two large enough for several patients. They may be used for differential diagnosis in contagious cases.

The main kitchen, although still in its old location, has been rearranged to bring the work area nearer to the windows and to provide more conveniences. The former nurses' dining room has become the maids' dining room, and a new dining room for nurses has been provided. This room, together with a new rest room for nurses, provides for the first time reasonably adequate accommodation for the nursing staff of both the floors. New ventilating equipment has been housed in a fan room constructed above the first-floor elevator lobby to make the utmost use of all available space in the building.



Reception room of the enlarged and improved Homberg Memorial Infirmary

M.I.T. Photo



M.I.T. Photo

From the nurses' station on the second floor of the expanded Homberg Memorial Infirmary, two wards are under observation.

Within the limits imposed by wartime scarcities, which were a severe handicap, every effort has been made to secure the best of each kind of equipment needed in the functioning of good medical service. New items include dental x-ray apparatus, a stereoscopic viewer, a developing tank combination, a kitchen range, steam sterilizers for the utility room, and many smaller but important items. Much study and selection have also gone into furniture, fittings, and colors. Several important items which will add to the cheerful atmosphere of the Infirmary are on order but have not yet been installed because of delayed deliveries.

The program of the Medical Department not only takes into consideration medical treatment but offers expert guidance in the care and conservation of physical and mental resources. This Department is now responsible for the health of more than 6,800 staff members, students, and employees, including the technicians, engineers, and scientists engaged on various important war projects. In addition to its facilities for general medical service, the Department maintains psychiatric and dental clinics as well as complete x-ray and pathological laboratories and a modern operating room. To these important features has been added an excellent eye clinic, a generous gift from Mrs. William R. Kales in memory of her husband, a graduate of the Institute in 1892 and a life member of the Corporation, who died in 1942.

During the past year, 38,538 visits were made to the Medical Department. This total includes 4,573 visits to the dental clinic. Under the direction of Dr. George W. Morse, Medical Director, prevention of illness is stressed in the Institute's health program, and students are encouraged to avail themselves of the facilities of the Infirmary for the slightest indisposition. An annual physical examination is required of all students. Analysis of the treatments given in the Medical Department shows that defective vision, the most common weakness, composes more than half the total number of cases on which advice has been sought.

New Department Established

APPOINTMENT of William L. Campbell, '15, as professor of food technology and head of a new professional Department devoted to education and research in food technology was announced by President Compton this month. Associated with Professor Campbell in the new Department will be Professor Bernard E. Proctor, '23, whose appointment as director of the Samuel Cate Prescott Laboratories of Food Technology was recently announced. The new Department of Food Technology includes and extends the scope of these laboratories.

"When we recently undertook a more formal organization for our work in food technology," said Dr. Compton in making the announcement, "the plan evoked so much interest that the Corporation Visiting Committee on the Department of Biology and Biological Engineering, under the chairmanship of Bradley Dewey, '09, recommended that we take the next step immediately by creating a full-fledged professional Department to expand the program previously carried on as a division of the Department of Biology and Biological Engineering. Just as our Department of Chemical Engineering, established some years ago, pioneered in its field, so we are convinced that the new Department has an opportunity to become the recognized center for knowledge in food technology and the application of the latest advances in nutrition to the processing of foods. Our objective, in addition to fundamental research leading to new developments in industry, is to train food technologists who will have the professional qualifications essential for leadership in research, development, production, and administration in their field. Professor Campbell's wide experience in industry and administration and Professor Proctor's background as a food technologist, especially as chief of the subsistence section of the research and development branch in the military planning division of the Office of the Quartermaster General, assure the aggressive development of food technology at the Institute."

Professor Campbell has worked for the past three years as consultant to the Army and Navy on production problems. He is a member of the board of technical advisers of the Quartermaster General's Office. For 10 years he was general manager of the Kroger Grocery and Baking Company, of which he became a vice-president and director in 1938.

During this period he was instrumental in developing new food processes and converted many accepted methods of manufacture into continuous operations. By modernizing equipment and increasing economy, he reduced costs and improved quality. He has constantly emphasized the fundamental importance of high quality in food and is one of the country's outstanding authorities on food manufacturing. Always acutely aware of the importance of research to industry, he has lent active support to research.

Discussing research in food technology on a broad scale, Professor Campbell pointed out that modern food technology requires knowledge of virtually all fundamental sciences and engineering and that the Institute, with its technical resources in personnel and facilities, is in an ideal position to expand its long-established research in food technology. He added that this research will attack such fundamental problems of the food industry as retention of natural flavor, color, nutritional value, and quality, and will then aid industry as well as contribute to science. The many advances which have been made in nutrition will be utilized in the food technology research program.

The war, with its special feeding problems, has done much, Professor Campbell said, to stimulate research in food, and there is every reason to believe that further research will bring many new developments in civilian feeding. Among the new developments to be expected, he said, will be lower prices, higher quality, better flavor, greater nutritional value, and less work for the housewife in preparing meals. Likewise, new products at present unfamiliar may be expected to appear in the market. These advances will keep the 50,000 food industries in this country in the position of world leaders in food processing and will be of enormous importance in supporting agriculture, our largest single industry.

"The tremendous world-wide problem of postwar reconstruction," said Professor Campbell, "cannot be carried out successfully by poorly fed, undernourished peoples. One of America's contributions to a stable peace will be made by supplying good and nutritious food in sufficient quantities to Europe. Food technology will play a major part in this effort."

Midwinter Meeting

On Monday, February 26, in Walker Memorial, with a cafeteria supper at six-thirty o'clock and a program at eight, the midwinter meeting of Alumni in the Boston area will be held. Dr. Compton will attend the gathering, which should not be confused with the annual Alumni Day banquet scheduled for Saturday, June 23. The committee for the Midwinter Meeting comprises Larcom Randall, '21, chairman, John T. Rule, '21, James Donovan, '28, and Robert C. Casselman, '39.

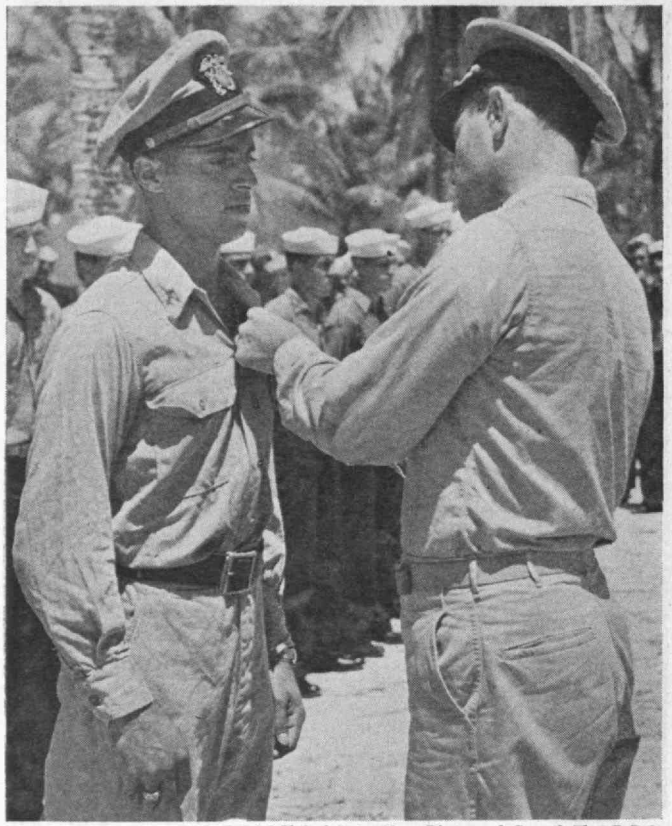
M.I.T. Photo

William L. Campbell, '15

Professor Campbell's first association with food technology at the Institute was in 1937, when he attended the first Food Conference, which was sponsored by Samuel C. Prescott, '94, then Head of the Department of Biology and Public Health, and by Dr. Proctor. At the second Food Conference, held at the Institute in 1939, Professor Campbell delivered the keynote address, in which he stressed the importance of quality control in food manufacturing. Since that time he has collaborated with the food technology research group at the Institute and for four years served on the Visiting Committee on the Department of Biology and Biological Engineering.

A native of Cincinnati, Ohio, where he was born in 1892, Professor Campbell attended the Friends' School in Baltimore and later attended schools in Manchester, Vt., and Plainfield, N. J. He was graduated from Yale University with the degree of bachelor of arts in 1913 and came to the Institute for his engineering training. He was a member of the Class of 1915. He then joined the staff of the Baltimore and Ohio Railroad, where he gained important operating experience. He left this post to serve in World War I as a first lieutenant in the air service of the Third Army Corps in the American Expeditionary Forces. Upon completing his service in 1919, he was appointed traffic manager of Billings and Spencer in Hartford, Conn., and later was placed in charge of the machine tool sales department of the Automatic Machine Company of Bridgeport.

In 1922 Professor Campbell was appointed assistant to the Operating Vice-president and later became a director of the subsidiary lines of the Erie Railroad, with which he was associated until 1927. In that year he became manager of the eastern division of the railroad department of the Timken Roller Bearing Company. The broad experience he had gained in various operating capacities led to a



Official United States Navy Photograph Seventh Fleet P.R.O.

In ceremonies at an advanced PT base somewhere in the southwest Pacific on October 9, Commander S. S. Bowling, commander, motor torpedo boat squadrons, Seventh Fleet, presented medals to PT crew members who have distinguished themselves in the service of their country. The medals were awarded by Vice-admiral Thomas C. Kinkaid, commander of Allied forces in the southwest Pacific. In our photograph, Commander Bowling presents the Silver Star to Lieutenant (junior grade) G. J. Azarigian, '43, of Hartford, Conn., "for conspicuous gallantry and intrepidity in action. In broad daylight, with utter disregard for his own safety, and in the face of fire from enemy gun emplacements, which he first silenced by fire from his own boat, he swam ashore, towing a life raft, and rescued a Royal Australian Air Force flight officer." Lieutenant Azarigian, in action against the enemy 28 times during 35 combat patrols, has participated in the destruction of 18 Japanese barges. His beaver class ring has traveled with him.

demand for his services as a consultant, and from 1927 until 1928 he was an industrial consultant for the firm of Curtiss and Sanger of Boston and New York. He then accepted a post with Lehman Brothers of New York and was appointed assistant to the President of the Amalgamated Leather Companies of Wilmington, Del., from 1930 until 1932, when he began his notable work for the Kroger Grocery and Baking Company. In 1942 he was appointed vice-president of the American Machine Defense Corporation of New York, where he carried on special engineering work on national defense projects. During this period Professor Campbell served as assistant deputy rubber director in association with William M. Jeffers and Colonel Dewey. In 1943 he was appointed vice-president in charge of manufacturing of the Brown Company of Berlin, N. H.

Professor Campbell is a member of the Engineering Institute of Canada and was formerly a member of the alumni board of Yale University. He has three sons, two of whom are in the service. The third is on the staff of Pan American Airways in Brazil.

New Textile Laboratory

THE Samuel Slater Memorial Research Laboratory, an important addition to the textile division of the Institute's Department of Mechanical Engineering, was opened on January 3. The facilities of this modern laboratory include the latest developments in electronic equipment for research on the physical properties of textiles.

The new laboratory is the result of a program of several years' duration sponsored by S. Slater and Sons, Inc., and will be operated under the direction of Professor Edward R. Schwarz, '23. A tribute to the pioneering work of Samuel Slater, grandfather of H. Nelson Slater who is now serving as a commander in the United States Navy and who made the presentation to the Institute, the laboratory will pioneer in the application of the most advanced scientific knowledge to research on fibers, yarns, and fabrics.

Technological developments in textiles have been many over the past 165 years, and in the Samuel Slater Memorial Research Laboratory it is planned to carry on research which will continue to anticipate future industrial progress. The equipment of the laboratory makes possible the study of the complex behavior of textile materials under a wide range of conditions in precisely controlled, year-round air-conditioned surroundings. Stresses of only a few grams may be applied over long periods of time in either tension or compression with automatic or semi-automatic recording of results. On the other hand, many hundreds of pounds may be so rapidly applied that the complete test is over in less than a thousandth of a second. For this work the deflection of an electron beam similar to that employed for television produces a fluorescent spot, the movement of which is photographed by a high-speed camera.

The data already obtained are of great interest and importance to Army and Navy aviation, and the virtual elimination of friction and inertia effects, common to usual testing apparatus, gives for the first time an accurate record of the behavior of such materials as parachute shroud lines, canopy fabrics, uniforms, climbing ropes, tenting, and many other textiles vital to the war effort. For the duration, the work of the laboratory will be devoted to such investigations, but for peacetime its value to the textile industry is expected to be equally significant. As an integrated part of the research and educational program of Technology, it provides unique facilities for training research workers and engineers, the demand for whom is much greater than the supply. The new laboratory represents a major addition to existing facilities and will bring to bear on textile problems the combined resources of the Institute's Departments.

In 1790, Samuel Slater, for whom the laboratory is named, built the first cotton-spinning machinery in America and started the first cotton mill in the country. This beginning was the start of the development of the textile industry, which has grown to millions of spindles and is one of the largest and most important of the nation's achievements in industrial growth. The National Museum in Washington has in its textile collection the original carding machine and the original spinning frame of 48 spindles built by Samuel Slater. One hundred years after its construction this spinning frame was again operated and produced excellent yarn.

Press Association

To Captain Luis de Florez, '11, the Robert J. Collier Trophy for 1943 was presented by former Vice-president Henry Wallace at ceremonies in Washington commemorating on December 17 the 41st anniversary of the Wright brothers' epochal flight. Director of the Special Devices Division of the Navy Bureau of Aeronautics, Captain de Florez has led the development of complex and effective means for training air crews. This work, parts of which were described in The Review for November, is signalized in the Collier award, which is made each year for the "greatest achievement in aviation in America, the value of which has been demonstrated by actual use during the preceding year."

Starred

THE names of seven members of the Institute's Faculty and of nine Alumni now engaged in scientific work throughout the country have been added to the list of starred scientists in the seventh edition of the biographical directory, "American Men of Science." To be starred in "American Men of Science" is one of the outstanding honors in recognition of eminence in scientific achievement.

Newly starred Alumni include the following: Dr. James H. Means, '06, Harvard University; Wilbur S.

United States Army Signal Corps Photo

Adam K. Stricker, Jr., '29, industrial engineer with the Signal Corps, received the Exceptional Civilian Service Award, highest civilian commendation of the War Department, from Major General H. C. Ingles, chief signal officer, at a ceremony in the Pentagon Building, Washington, D. C., on December 11. Mr. Stricker, on war leave from the office of the chairman of the General Motors Corporation, received a citation signed by the Secretary of War, reading: "In recognition of his outstanding planning and organizational ability in the development of systems which greatly facilitated the procurement, storage, packaging, and issue of Signal Corps equipment. By his perseverance and untiring efforts he contributed immeasurably to the nation's war effort."

Burbank, '19, United States Geological Survey; Brian P. O'Brien, '19, University of Rochester; George Calingaert, '23, Ethyl Corporation; Bernard Lewis, '23, United States Bureau of Mines; Charles A. Thomas, '24, Monsanto Chemical Company; Merrell R. Fenske, '28, Pennsylvania State College; Robert C. Elderfield, '30, Columbia University; and William Shockley, '36, Bell Telephone Laboratories.

Newly starred members of the staff are Robley D. Evans, Ernst A. Hauser, Ernest H. Huntress, '20, Walter H. Newhouse, '23, Wayne B. Nottingham, Francis O. Schmitt, and Julius A. Stratton, '23.

Professor Evans, a graduate of the California Institute of Technology, from which he received his bachelor's degree in 1928 and his doctorate in 1932, has been a member of the Institute's staff in the Department of Physics since 1934. He was promoted to the rank of associate professor in 1938. He has done much research in the field of applied nuclear physics, especially in radioactivity and its relation to geology, biology, chemistry, medicine, and industrial physics.

Dr. Hauser, Associate Professor of Chemical Engineering, is internationally known for his researches on rubber and other colloidal materials. He is perhaps most closely identified with the discovery of the method of producing from clay a material called Alsifilm, said to be the first inorganic substance to have been formed into a fibrous mass.

Dr. Huntress, Professor of Organic Chemistry, is widely known for research in that field. After his undergraduate work at the Institute he remained for graduate studies and was awarded his doctorate in philosophy in 1927. He has been a member of the staff since his graduation in 1920 and was promoted to the rank of full professor in 1941. During the war he has been a technical adviser to the Chemical Warfare Service Development Laboratory at the Institute.

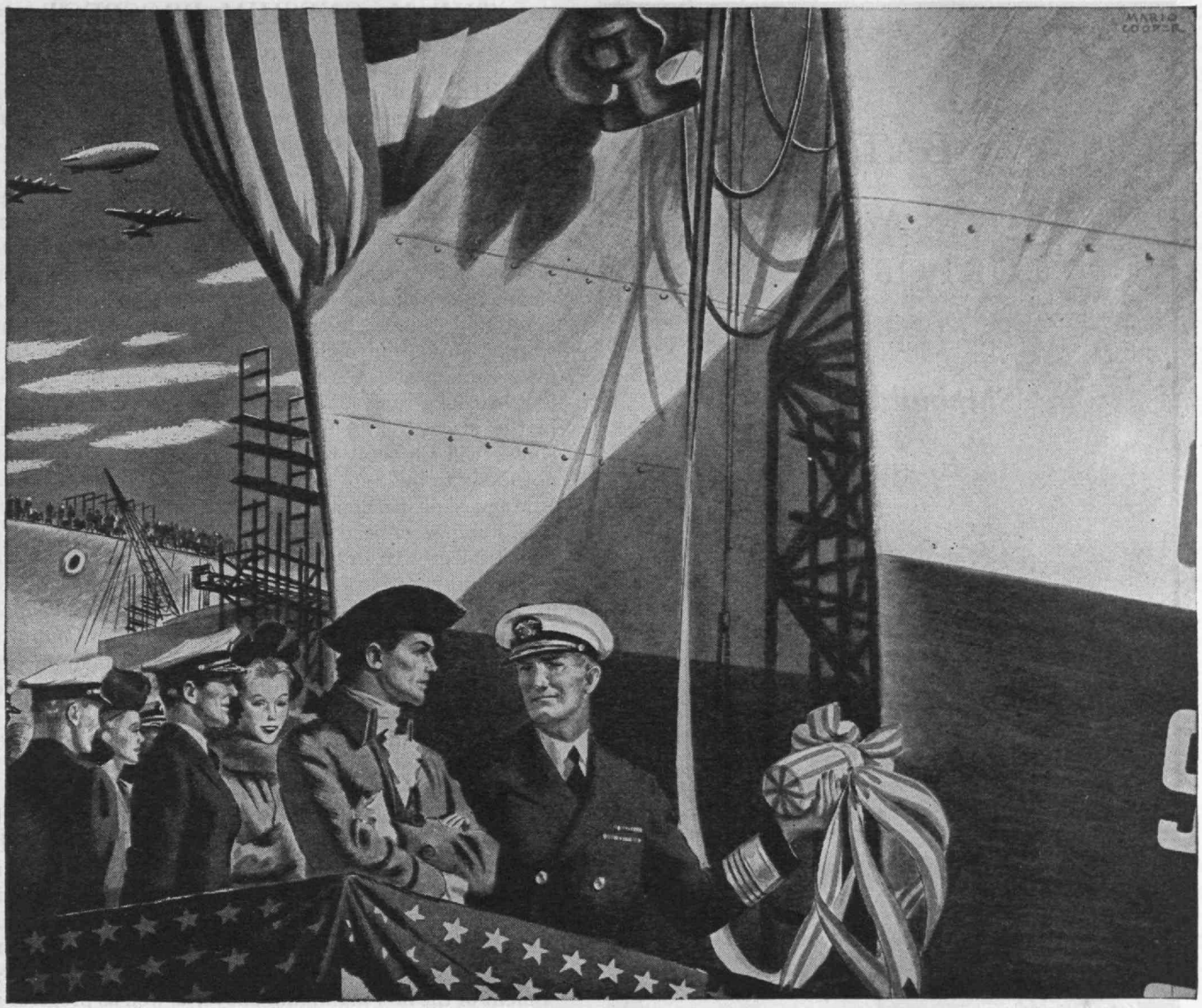
Professor Newhouse, a graduate of Pennsylvania State College in 1921, came to the Institute for graduate work and received his doctorate in philosophy in 1926. He was made an instructor in the Department of Geology in 1923, while carrying on his graduate work, and was promoted to the rank of professor of economic geology last June. He is widely known for his exceptional ability as a teacher and for his research in economic geology.

Professor Nottingham joined the staff of the Department of Physics in 1931. He was an American-Scandinavian fellow at the University of Upsala and later took graduate work at Princeton University, for which he was awarded his doctorate. He has done notable research on photoelectric phenomena, electron emission, and properties of metallic surfaces.

Dr. Schmitt, Head of the Department of Biology and Biological Engineering, is internationally recognized for his contributions to biological research, in which he has used the x-ray, polarized light, spectroscopy, the electron microscope, and other tools and techniques of experimental physics in fundamental biological investigations. He was educated at Washington University, St. Louis, which granted him the degree of bachelor of arts in 1924. Three years later he was awarded his doctorate in philosophy. From 1927 to 1929 he was a National Research Council fellow in chemistry, returning thereafter to teach at Washington University, where he remained until he came to the Institute in 1941.

Professor Stratton joined the staff of the Department of Electrical Engineering in 1924, a year after he had received his bachelor's degree at the Institute. He continued his advanced work and in 1925 was awarded the degree of master of science. He then went abroad for postgraduate study at the University of Zurich, where he won the degree of doctor of science in 1927. Dr. Stratton was made a full professor in the Department of Physics in 1941, and in addition to teaching he has carried on significant research in the field of electromagnetic theory. At present he is associated with an important government war research project. *(Continued on page 268)*

At the Naval Ordnance Laboratory in Washington, these M.I.T. men recently gathered for their photograph. They are, from left to right, back row: Ensign Alvin H. Shairman, '43, Arthur O. Black, Jr., '43, Milton B. Dobrin, '36, John M. Wheeler, '41, Carroll C. Smith, '28, Warren E. Thomson, '38, Frank A. Clary, Jr., '33, Robert S. Prescott, '32, Andrew F. Hillhouse, Jr., '43, G. Dudley Mylchreest, '36, and Joseph F. Keithley, '37; front: Royal Weller, '27, Captain Ralph D. Bennett, who was professor of electrical measurements when he was called to active duty in 1940, Arthur G. Russell, '32, and James E. Mulligan, '33. The Technology group at the laboratory also includes Theodore E. Dinsmoor, '40, Robert T. Dorsey, '40, Ensign Sam Fry, '41, Paul M. Murphy, '40, Doyle L. Northrup, '31, Clinton E. Pearce, '13, Matthew J. Relis, '41, Charles E. Ryan, '37, Morrie P. Seiple, '43, Herbert Small, '35, and Richard H. F. Stresau, '38, who are not in the picture. Describing the laboratory's work recently, Captain Bennett, technical director of the laboratory, pointed out that it began as a mine and fuse development organization just after the last war and has expanded greatly in the present conflict. He foresaw need for further expansion in future but declared that rather than attempt to carry out all the research of the Bureau of Ordnance by itself, it will serve as a clearinghouse for the assignment of work, with the task of getting for the forces afloat the new developments for which they see a need and of suggesting to them the development possibilities of new discoveries.



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THE MAGNESIUM PROSPECT

(*Continued from page 238*)

A BRIEF look at specific fields of use involves considerable guesswork but may be a little better than nothing. Let us talk in terms of annual requirements as of some five years from now.

First we shall mark down to zero the long-run foreign markets for both metal and semifabricated products. Raw materials are limitless in all parts of the world. Magnesium may be made from ocean water, or from various common ores such as dolomite or magnesite, or from underground brines. Like ourselves, most of the other warring nations have plant capacity far in excess of their foreseeable peace needs. The remainder can build plants for their long-run requirements, and probably will do so in the interest of self-sufficiency. Some short-run purchases will probably appear sporadically, but they are not likely to build up to any great volume.

Magnesium products do not appear in a bare subsistence standard of peacetime living or in the first stages of industrial growth or reconstruction. The early postwar magnesium needs of the rebuilding countries are not likely to amount to much. Regarding Germany and Japan, Harold G. Moulton and Louis Marlio in *The Control of Germany and Japan* state that magnesium manufacture could be split up in small units and spread through other legitimate chemical or metal operations. Prohibition of it could not be enforced, they believe, and therefore they recommend that it not be attempted.

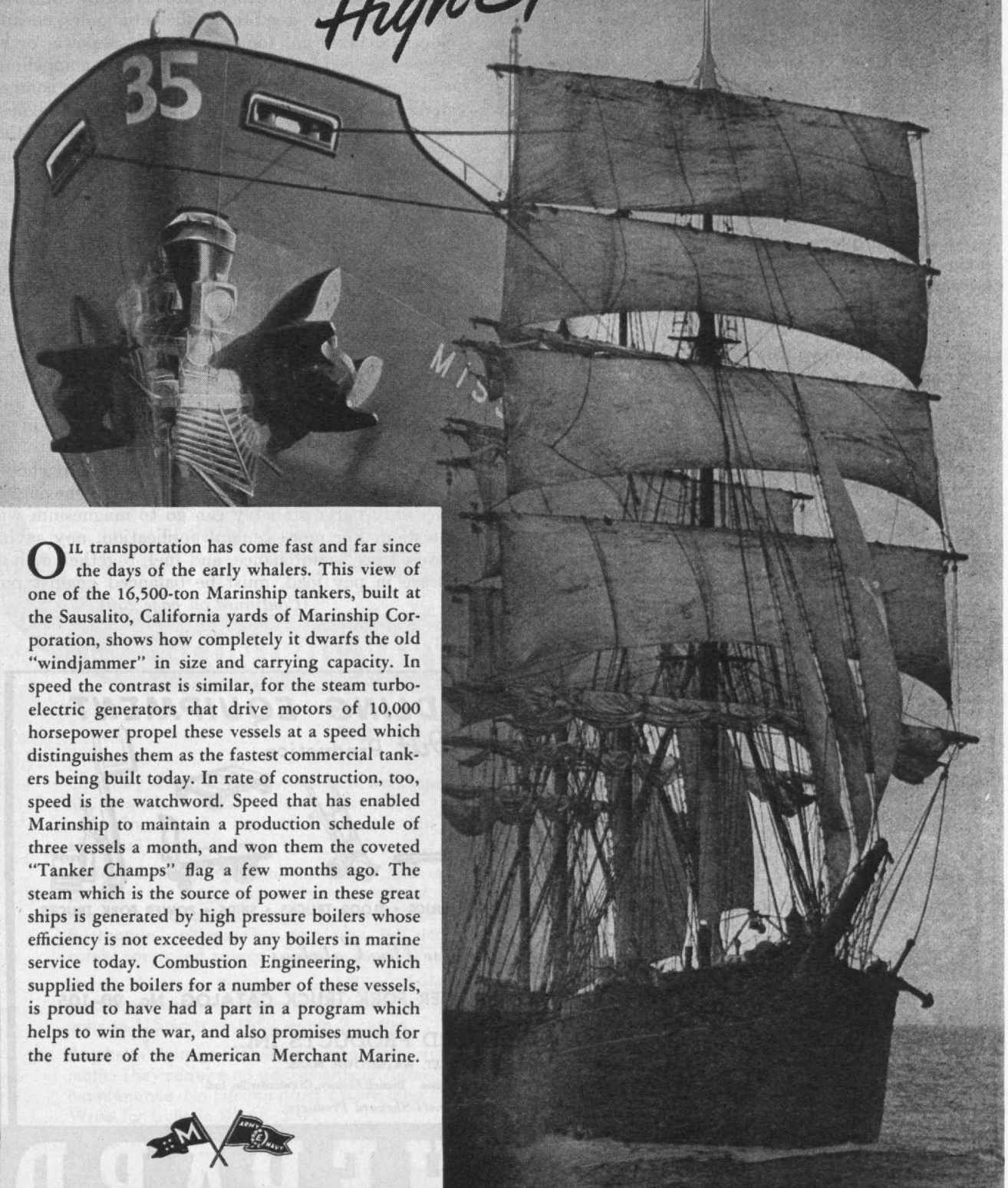
Postwar aircraft requirements are far from definite. The number of military aircraft to be produced annually is unknown, but let us assume 5,000 a year. They will be distributed among trainers, fighters, and bombers, and an optimistic estimate for use of magnesium therein will range from 250 to 2,000 pounds for each plane. It is true that some aircraft engineers show great interest in more extended use of magnesium, but others believe the development of the new aluminum alloys, as well as progress in wood, plastics, and steels, will challenge magnesium's field of application and limit its growth in aircraft. Assuming an average of 1,500 pounds a plane, the military aircraft requirement is 7,500,000 pounds a year.

The number of commercial aircraft probably will increase greatly. Compared with today's military air program, however, commercial aircraft are almost insignificant. In 1940 the average number of commercial airplanes in use was about 350 of the 21-passenger DC-3 type. These planes carried a load of 1,147,000,000 passenger-miles. In the same year the total passenger-miles via Pullman were 8,213,000,000. In 1943 less than 200 airplanes handled 1,643,000,000 passenger-miles at an average utilization of 9 hours and 48 minutes per airplane per day. If we assume postwar commercial air traffic to equal the total of air travel plus all the Pullman travel in 1940, and assume utilization of the airplanes to be no greater than in 1940, approximately 3,000 commercial airplanes will be required.

As a comparison with this estimate of 3,000 commercial airplanes in domestic use five years from now, we cite an address by William A. Patterson, President of United Air Lines, Inc., in which he forecast that eventually a total air fleet would be required as follows: 3,000 twenty-passenger planes of about DC-3 size; 1,500 fifty-passenger

(*Continued on page 250*)

AMERICA'S *High Speed* TANKERS



OIL transportation has come fast and far since the days of the early whalers. This view of one of the 16,500-ton Marinship tankers, built at the Sausalito, California yards of Marinship Corporation, shows how completely it dwarfs the old "windjammer" in size and carrying capacity. In speed the contrast is similar, for the steam turbo-electric generators that drive motors of 10,000 horsepower propel these vessels at a speed which distinguishes them as the fastest commercial tankers being built today. In rate of construction, too, speed is the watchword. Speed that has enabled Marinship to maintain a production schedule of three vessels a month, and won them the coveted "Tanker Champs" flag a few months ago. The steam which is the source of power in these great ships is generated by high pressure boilers whose efficiency is not exceeded by any boilers in marine service today. Combustion Engineering, which supplied the boilers for a number of these vessels, is proud to have had a part in a program which helps to win the war, and also promises much for the future of the American Merchant Marine.

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THE MAGNESIUM PROSPECT

(*Continued from page 248*)

planes of about DC-4 size; 750 one hundred-passenger planes of some new design. Passenger business principally would be sought, but eventually a cargo rate of 10 cents per ton-mile would be offered by the air lines. The eventual traffic to be handled by the above fleet was estimated to include ⅔ of the Pullman business, ⅓ of the railroad coach business, ⅓ of the interstate bus business, ¼ of the railway express business, ¼ of the parcel post business, 1/10 of the less-than-carload-lot freight business.

Going back to our figure of 3,000 airplanes and counting only five years as the average life of each plane, we can assume that the normal requirement each year for commercial airplanes is only 600. On a basis of 1,500 pounds of magnesium per airplane, the total magnesium for commercial aircraft runs less than 1,000,000 pounds a year. These estimates make no allowance for existing military cargo aircraft which, if sold to the air lines after the war, will cut down the need for new aircraft.

Before the war, private aircraft used practically no magnesium. Some castings, such as wheel and engine castings, may be employed after the war, but the progress in major assemblies such as wings is likely to be slow. Two factors oppose each other in the economics of the private airplane: When small planes begin to be mass produced and sold on a competitive price basis in a large market, relatively small price differences will become more important, just as they are in passenger automobile selling. On the other hand, weightsaving shows up immediately to the purchaser of a small plane. A 10-pound saving will allow the owner to install a radio or carry extra luggage, and he sees the advantage concretely. A liberal guess would place the annual magnesium requirement for private aircraft at 2,500,000 pounds.

Magnesium for passenger autos is highly controversial. With good roads, good tires, efficient engines, cheap gasoline, and taxes not too high on a horsepower or weight basis, the need for weightsaving is not so compelling here as it is on the Continent. In this country the competitive need for a low selling price is paramount. Magnesium's price per piece will be particularly important in the passenger car field. One large manufacturer claims he can produce his cars as light as is desirable without magnesium, and that without magnesium they are more rugged and cheaper than with it. On the other hand, a prospective manufacturer of a modified jeep-type private car is said to be contemplating up to 100 pounds of magnesium on each unit. Magnesium fabricators have been working with magnesium wheels and have cited their reducing a car's unsprung weight with resulting increase in tire life. This may be a good idea technically, but the economics and marketability of it are not yet clear. The outlook for passenger car use of magnesium is not immediately bright, but we can assume 2,500,000 pounds annually.

Bus and truck applications will be approached more definitely from a business point of view. Some engine and accessory parts probably can go to magnesium without question. For more general application, any savings in taxes, tires, maintenance, and fuel, together with an increase in pay load, must be balanced against possible

(*Continued on page 252*)

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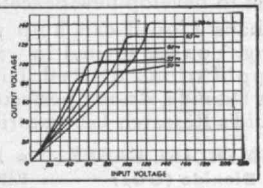

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THE MAGNESIUM PROSPECT

(*Continued from page 250*)

greater first cost and perhaps a higher repair and replacement cost for the magnesium parts. Before the war Germany, Great Britain, and the United States each had a few experimental trucks or busses of magnesium, while many London and Berlin busses had magnesium wheels. The total weight of the four wheels on the Berlin busses was reduced from 810 pounds to 284 pounds, and tire life was increased 100 per cent. The wheels evidently were quite successful, under their particular operating conditions, but no general conclusions were reached on the economics of a complete magnesium bus or truck. Several manufacturers in the United States already are working on experimental models, and activity no doubt will quicken as service data are gathered. Let us assume 2,500,000 pounds as the yearly magnesium requirement for busses and trucks.

Water transportation is a field not seriously explored as yet. The Dow Chemical Company has had a number of all-magnesium canoes built and in successful use for about 10 years. Corrosion is usually considered a handicap for such applications, but it now appears to be less important than previously supposed. In private craft some use of magnesium probably would be made, particularly if a better appearance and improved protection against corrosion are developed in the near future. The same comment applies to all water transportation. Commercial craft have the incentive of increased pay load for a given dead weight, while in naval vessels the great amounts of antiaircraft protection and armament require some compensatory reduction in weight of other equipment above the water line. Five hundred thousand pounds a year are a reasonable assumption for magnesium utilization in the water transportation field.

Portable tools were beginning to use substantial quantities of magnesium before the war and are likely to continue. Replacement of war-worn tools will be considerable, and the need for new types and new designs will continue. Foundry equipment also was a promising pre-war market and has begun already to enlarge its use of magnesium. For portable tools and equipment, we may assume a magnesium requirement of 2,500,000 pounds annually.

Industrial machinery has received attention, especially in the textile field and for other types of equipment using fast-moving parts. Such items as warp beams, requiring stiffness with light weight, are ideal for magnesium; production of some of this equipment was recommenced about a year ago. In high-speed machinery the use of magnesium reduces both the power and the maintenance required. One major manufacturer considers this field important enough to devote a whole series of advertising to "Magnesium — the Metal of Motion." For industrial machinery, we shall assume 10,000,000 pounds of magnesium a year.

Furniture and other consumers' goods are being investigated by the magnesium industry. Baby carriages, kitchen ladders, furniture of all kinds, especially that which is moved frequently, are possible fields of exploitation. The industry's expansion into this market may depend somewhat on whether it can move fast enough to establish itself in time for the replacement boom which is

(*Continued on page 254*)

The official caption of this official Navy Photo reads, "Top flight radio operators plus top flight equipment equals top flight performance at an African clearing base for the Italian Front."

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NATIONAL RECEIVERS ARE IN SERVICE THROUGHOUT THE WORLD

THE MAGNESIUM PROSPECT

(*Continued from page 252*)

commonly expected immediately after the war, or possibly before, if sufficient manufacturers of consumers' goods are permitted to re-enter their old fields prior to the end of the war. Magnesium now is more readily available than are some of the competing new materials, but much development work will be necessary to establish it in this field. Whether or not this work can proceed fast enough for it to overcome the historical position of other materials remains to be seen. A change in styles, away from the bare metal surface now commonly used in metal furniture, could favor magnesium's competitive chances. Such a trend would require paint or other colored finishes to be developed for aluminum and stainless steel, as well as for magnesium. Recognizing this, manufacturers of the other metals, as well as of magnesium, are working hard to obtain satisfactory colored finishes for their materials. An important factor in this market, of course, is the general economic state. If purchasing power is maintained and the public is spending a greater amount of money for new and more expensive types of goods, magnesium's prospects will be brighter. If, however, purchasing power drops, the luxury items will suffer first, and people who previously would pay for light weight or novelty in their furniture will afford only the necessities. The furniture and consumers' goods fields have no history in magnesium, but we shall assume that in future they will use an annual 5,000,000 pounds.

Most of the high-strength aluminum alloys which have come into prominence for production of war airplanes require magnesium as an alloy constituent. The amount of magnesium which will be needed for this purpose in postwar years depends upon the use of these high-strength aluminum alloys, and estimates of that are as difficult to make as are magnesium estimates. We shall allot 7,500,000 pounds a year to that purpose.

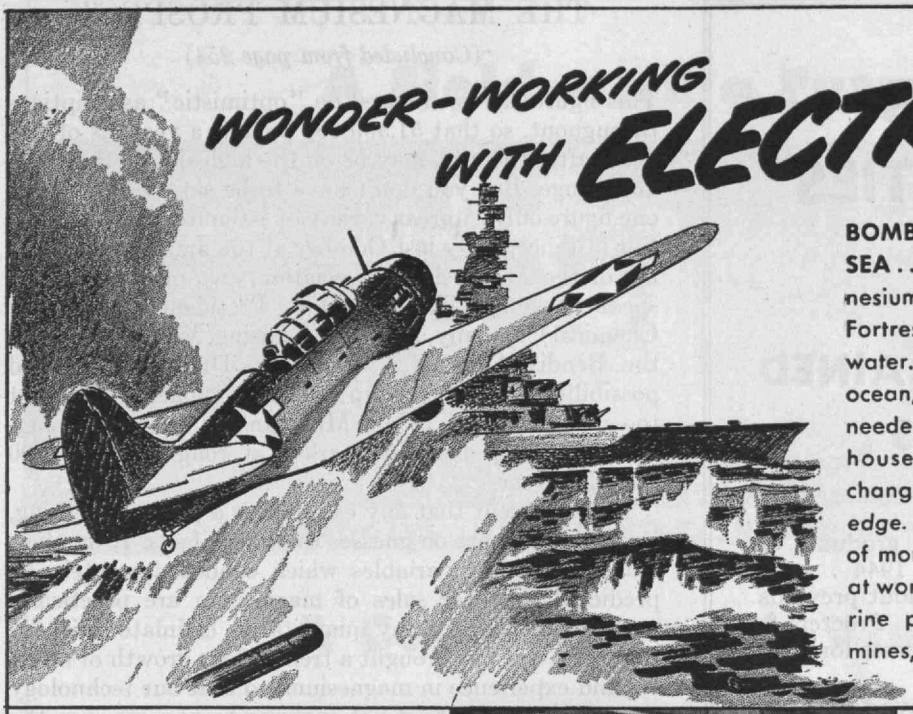
Various chemical uses are made of magnesium — for instance, for debismuthizing lead and as a scavenging, or deoxidizing, agent. Recent announcements indicate the possible use of tremendous quantities of magnesium for minimizing corrosion in large pipe lines. For all chemical uses, we shall assume 10,000,000 pounds a year.

The result of the preceding series of guesses and longshot estimates is summarized as follows (in millions of pounds per year):

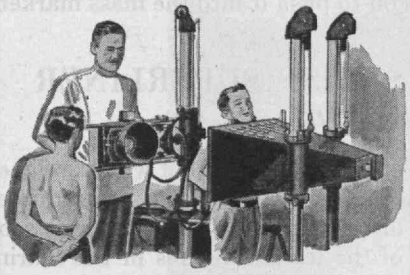
Air transportation	11.0
Land transportation	5.0
Water transportation	0.5
Portable tools	2.5
Industrial machinery	10.0
Consumers' goods	5.0
Alloying aluminum	7.5
Chemical uses	10.0
Export	—
Total	51.5

(*Concluded on page 256*)

WONDER-WORKING WITH ELECTRONS

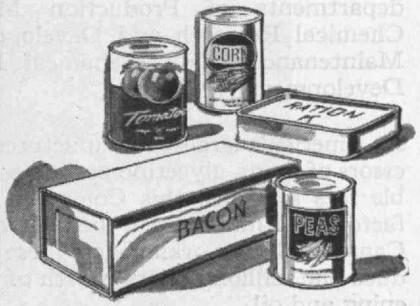


BOMBERS FROM THE BOTTOM OF THE SEA . . . There's a fabulous amount of magnesium . . . enough for 4,000,000 Flying Fortresses . . . in every cubic mile of sea water. To extract this vital metal from the ocean, vast quantities of d-c electricity are needed. An electronic device, the Westinghouse Ignitron, supplies this current by changing a-c to d-c — *right at the water's edge.* Ignitrons, with a combined capacity of more than 3,000,000 kilowatts, are now at work in magnesium, aluminum and chlorine plants, in electric railway systems, in mines, in many war industries.

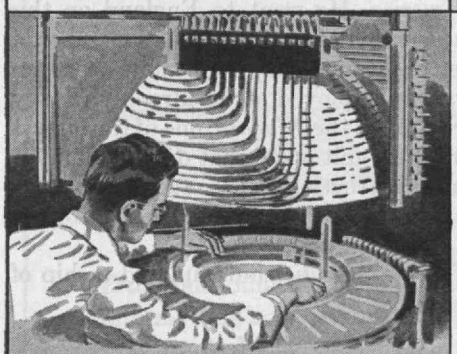


A NEW X-RAY machine, built by Westinghouse, makes possible the examination of 1000 school children daily — for symptoms of tuberculosis. X-ray pictures are taken by a 35 mm candid camera — at a cost of less than 1¢ per exposure.

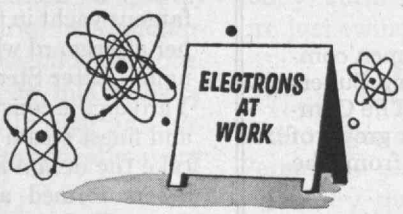
DUST TAKES A HOLIDAY . . . Dust-free air is absolutely essential in the assembly of optical equipment for our fighting forces. The Westinghouse Precipitron* electronic air cleaner automatically removes dust particles down to the size of 1/250,000th of an inch.



S-T-R-E-T-C-H-I-N-G THE TIN SUPPLY . . . Electronic high-frequency induction heating — developed by Westinghouse — helps save *two-thirds* of our war-scarce tin supply by flowing a protective tin coating, only 30-millionths of an inch thick, on steel strip.

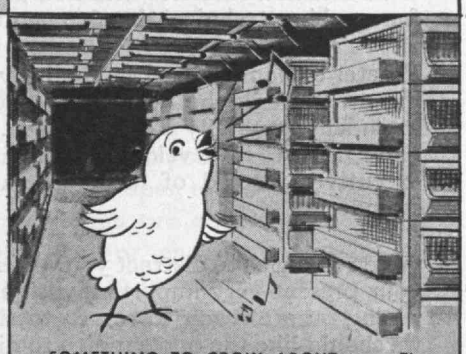


ELECTRONIC CHEMIST . . . The Westinghouse Mass Spectrometer analyzes intricate gas mixtures at amazing speed. In making synthetic rubber, for example, this electronic device cuts the time of chemical analysis from *days* to a matter of *minutes.*



Although one of the tiniest things in the universe, the electron is a gigantic force for the good of mankind. It is helping us to win the greatest war in history. It speeds production of goods for war and peace . . . brings entertainment into our homes . . . contributes to our health and happiness in countless ways. *And wherever you find electrons at work you will find Westinghouse electronic research at the forefront!*

*TRADE MARK REG. U.S. PAT. OFF.



SOMETHING TO CROW ABOUT . . . The Westinghouse Sterilamp*, an electronic device, deals sudden death to air-borne bacteria in brooder batteries — *has reduced chick mortality by 50%.* Sterilamps are widely used in restaurants, canneries, breweries, and many other industries.

Tune in:
JOHN CHARLES THOMAS
Sunday 2:30 pm, EWT, NBC

Westinghouse
PLANTS IN 25 CITIES OFFICES EVERYWHERE

Tune in: TED MALONE
Mon. Tues. Wed. Evening,
Blue Network

THE MAGNESIUM PROSPECT

(*Concluded from page 254*)

This figure has been based on "optimistic" assumptions throughout, so that 51,500,000 pounds a year, as of five years after the war, may be on the high side of the probable range. But you don't have to be satisfied with this one figure only. A great variety of estimates are available. For instance, early last October at the first annual meeting of the Magnesium Association, two of the featured speakers were Willard H. Dow, President of the Dow Chemical Company, and R. P. Lansing, Vice-president of the Bendix Aviation Corporation. Dr. Dow sketched possibilities of our using up our entire capacity in the not too distant future, while Mr. Lansing estimated magnesium's early postwar market at roughly 20,000,000 pounds a year.

It is apparent that any estimate is a precarious thing, based as yet more on guesses than hard facts. It involves many important variables which cannot accurately be predicted. Pre-war sales of magnesium are practically useless as a base for any quantitative estimate of its future. The war has brought a tremendous growth of interest and experience in magnesium, so that our technology generally is equal to if not superior to any other in the world. Magnesium is being taken from the specialty shelf, and the campaign is on to push it into the mass markets.

AMERICA'S LAST SUPERLINER

(*Continued from page 240*)

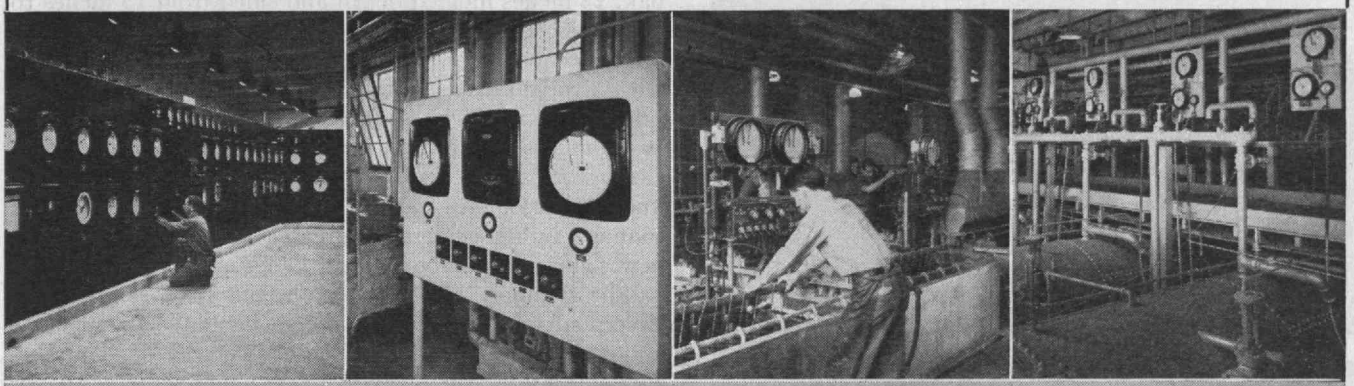
produced a 31-foot, fine-lined rowing skiff which weighed but 140 pounds, and in his early twenties he graduated to the construction of ocean-going vessels and was soon unquestionably one of the leading figures in the marine construction field in New York City. In 1848, as an employee of William H. Brown, Steers had much to do with the design and construction of the four original Collins liners, particularly the *Atlantic* and *Arctic*, for which he laid down the lines in the mold loft. Later he built several pilot boats which became famous for speed, and in 1850 he designed the *America*. He went to England on this famous yacht in the summer of 1851, and was a member of her afterguard when she won the cup which now bears her name. Later Steers was employed at the Brooklyn Navy Yard on the construction of the *Niagara*, one of the largest and finest steam frigates built up to that date. To undertake the design and construction of the *Adriatic*, George Steers formed an association with his eldest brother, James R. Steers.

Steers's design for the *Adriatic* contemplated a ship of the following dimensions:

Length	354 feet
Beam	50 feet, extreme
Depth of hold to spar deck	33 feet 2 inches
Tonnage	5,888 tons (customhouse measurement)
Draft, loaded	20 feet
Draft, light	17 feet 1½ inches
Accommodations	350 cabin
	200 second cabin
	1,000 steerage
Freight	800 tons (measurement)

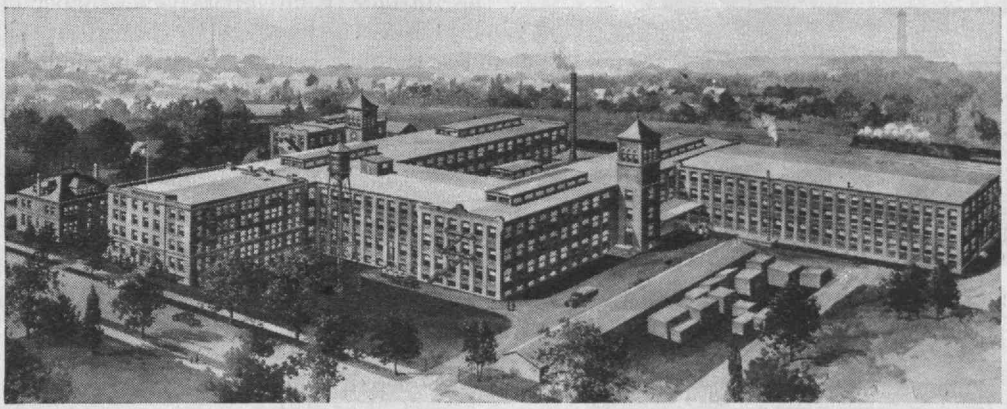
(*Continued on page 258*)

A Field with a Future . . .



PROCESS INSTRUMENTATION FOR ALL INDUSTRY

A Company with Vision . . .



AN OPPORTUNITY FOR SALES ENGINEERS!

To men now seeking rehabilitation from wartime industries, the field of industrial instrumentation offers unusually broad professional horizons. Founded less than four decades ago, this industry is still young and progressive, with vast unsaturated potentials. Its market covers practically every type of manufacturing!

A Recognized Leader in the Field

From the founding of the industry, The Foxboro Company has held unquestioned leadership in the development of instruments for accurate processing. Original introduction of many advanced types of instruments has been made by Foxboro. And today, further significant Foxboro developments are just swinging into production.

Field Engineers Needed

The Foxboro Company now is expanding its sales staff to serve demands of peacetime industries. Permanent positions are open to the right men.

Primary qualifications are sales aptitude and mechanical, electrical or chemical engineering education. Experience in instrumentation or electronics is desirable but not essential, as complete training course follows employment.

Apply by letter, giving complete outline of education, experience and personal statistics.

THE FOXBORO COMPANY, 1820 Neponset Ave., Foxboro, Mass.

Makers of

FOXBORO Reg. U. S. Pat. Off. **CREATIVE INSTRUMENTATION**

AMERICA'S LAST SUPERLINER

(*Continued from page 256*)

Steers built the hull of wood, the floor timbers being of oak, 22 inches molded depth and sided from 13 inches to 16 inches. The frames were spaced from 33 to 36 inches apart, center to center, and were diagonally strapped with wrought iron ⅞ by 5 inches. Planking of yellow pine varied in thickness from 12 inches at the garboards to six inches at the sheer strakes.

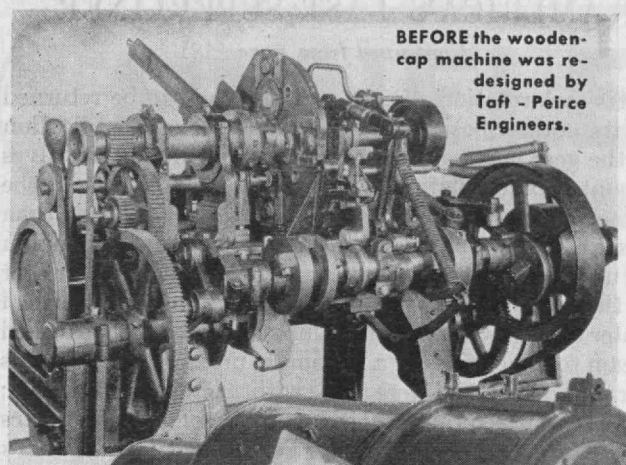
As work progressed on the big wooden hull, it was known that Cunard was building a rival of slightly smaller tonnage but considerably greater length and that the new Cunarder, to be named *Persia*, would be an iron paddle steamer. The *Persia* came out first, sailing from Liverpool on her maiden voyage in January, 1856, at about the same time as the Collins liner *Pacific*. The *Persia* made a slow trip, delayed by ice. The *Pacific* was never heard from. The question of reducing the subsidy was promptly revived, and in this unfriendly atmosphere the *Adriatic* was launched in April, 1856, at once becoming the largest vessel afloat.

George Steers personally supervised the launching of the *Adriatic*. Contemporary newspaper descriptions enlarge upon the huge size of the vessel, the beauty of her lines, the fine workmanship of the hull, and the impressiveness of the spectacle of the launching, which was enhanced by the launching of the steamship *Cuba* from Webb's yard shortly before Steers released the *Adriatic*. When the *Adriatic* was finally released, her hull slid smoothly down the ways into the waters of the East River, but arresting gear in the form of anchors provided for checking the run of the ship proved inadequate, and she crashed into a wharf at Williamsburg, doing some damage to the pier but little to her hull. After launching she was immediately taken to the balanced dry dock to be coppered, following which operation her machinery was to be installed.

Machinery built for the *Adriatic* by the Novelty Iron Works of New York had unusual features, two of which led to much of the trouble which dogged the ship's career. The engines were of the two-cylinder oscillating type, designed to indicate 5,000 horsepower, the bore of the cylinders being 100¾ inches and the stroke 12 feet. The cylinders were placed diagonally, but to avoid stresses which would be produced in a long crankshaft running the full width of the ship when the wooden hull "worked" in bad weather, there was a separate shaft for each paddle wheel, each shaft terminating at its inboard end in a crank which engaged the piston rod of one of the oscillating cylinders. These two cranks were connected by a drag link which insured that the two cylinders of the engine and the two side wheels would work together, but permitted a certain amount of flexibility. Oscillating engines were not unusual for large paddle wheel vessels at the time the *Adriatic* was built, but the engine of the *Adriatic* was fitted with valves of a new and untried type which proved very troublesome.

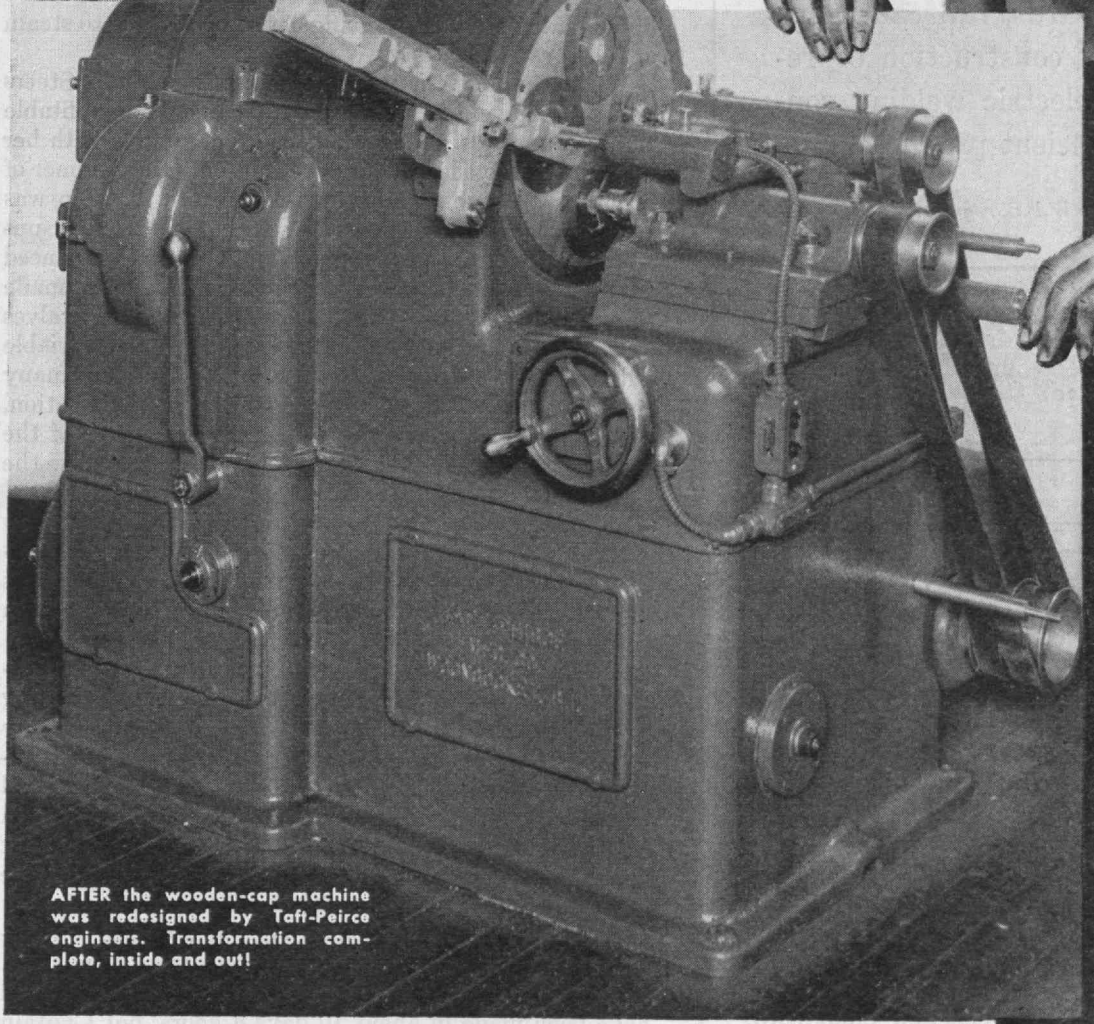
These valves, designed by Horatio Allen, consisted essentially of long plug cocks, the plugs having a very slight taper. The valves were opened and closed by a partial rotation of these plugs, but such rotation could not be effected without first giving the valves a slight longitudinal motion to free them from their tight tapered fit.

(*Continued on page 260*)



BEFORE the wooden-cap machine was redesigned by Taft - Peirce Engineers.

"Here's how TAFT-PEIRCE redesigned my machine"



AFTER the wooden-cap machine was redesigned by Taft-Peirce engineers. Transformation complete, inside and out!

This manufacturer's machine, which made wooden caps and closures for bottles and containers, was getting left in the ruck by newer and more versatile machines which could produce plastic caps in quantity and in color. So he decided to pack up his trouble and *Take It To Taft-Peirce.*

Taft-Peirce Contract Service engineers redesigned the old machine from the ground up, gave it new efficiency, modern appearance, far greater capacity and finer quality of product.

This is one of hundreds of chapters in the case-book of the Taft-Peirce Contract Division, covering everything from the design of a single tool or part, to the design, tooling, and production of complete machines *in quantity.*

The Taft-Peirce Mfg. Co., Woonsocket, R. I.

★ FOR DESIGN, DEVELOPMENT, TOOLING, CONTRACT MANUFACTURING . . .

Take it to T-P *Taft-Peirce*

AMERICA'S LAST SUPERLINER

(*Continued from page 258*)

After each rotation, of course, a valve had to be returned to its normal position longitudinally. The complication of the gear necessary for imparting this motion to valves mounted on oscillating cylinders and for providing at the same time a variable cutoff, can be better imagined than described. The engine of the *Adriatic* was also unusual in its use of a surface condenser which furnished fresh water to the eight large boilers containing a number of vertical water tubes, two inches in diameter. The boilers furnished steam to the engines at a maximum pressure of 26 pounds per square inch and were fitted with a total of 48 furnaces; it was estimated that coal consumption of all the furnaces would be about 100 tons a day. The capacity of the ship's bunkers was 1,200 tons, giving her sufficient fuel to steam at full speed for 12 days.

When the *Adriatic* was launched, Collins and Steers hoped to have her in service to catch the profitable summer business of the year 1856, yet trouble with her machinery proved so serious that not only the summer of 1856 but also most of 1857 passed before the ship was ready to sail. The unusual valve gear proved almost unworkable, and in addition much trouble was experienced with the surface condenser. At one time plans were made to remove the entire installation of Allen's plug valves and to substitute a type of poppet valve and variable cutoff gear which was proving satisfactory on many American beam and side-lever engines. The substitution, however, proved impracticable, and the engineers of the Novelty Iron Works and the Collins Line returned to the task of making the Allen valves workable.

In August, 1856, the *Adriatic* then not having left New York for Liverpool on her maiden voyage, Congress sealed the fate of the Collins Line by serving notice of its intention to reduce the subsidy. Collins decided to go down fighting, however, and on November 21, 1857, the *Adriatic* cleared from New York for Liverpool with 38 first-class passengers in accommodations capable of holding over 300 in comfort. There was a final exasperating delay due to trouble with the valve gear after the ship had actually cleared, and she did not leave New York Harbor until the 23d. When once the *Adriatic* got to sea, she proved fast and comfortable, on some days reaching the almost unheard-of speed of 15 knots in the open Atlantic. The voyage to Liverpool was not, however, an unusually fast one, the ship reaching Point Lynas at 9:00 P.M. on December 3, after a run of 10 days 4 hours from New York. Had she proceeded direct to Liverpool, the passage would have been made in about 10 days 8 hours, but Captain West, in consequence of bad weather, prudently decided to lay to for the night off the mouth of the Mersey and did not get under way to ascend the river until nearly high water of the next flood tide. Upon her arrival in Liverpool, the *Adriatic* was greatly admired for the beauty of her lines and the luxury of her appointments. These, however, were characteristics incapable of doing much to bolster up the tottering finances of the line, and in January, 1858, after the return of the *Adriatic* to New York, the Collins Line suspended operations.

The end of the Collins Line was undoubtedly hastened by the fact that the late months of the year 1857 and the early months of the year 1858 were marked by a serious

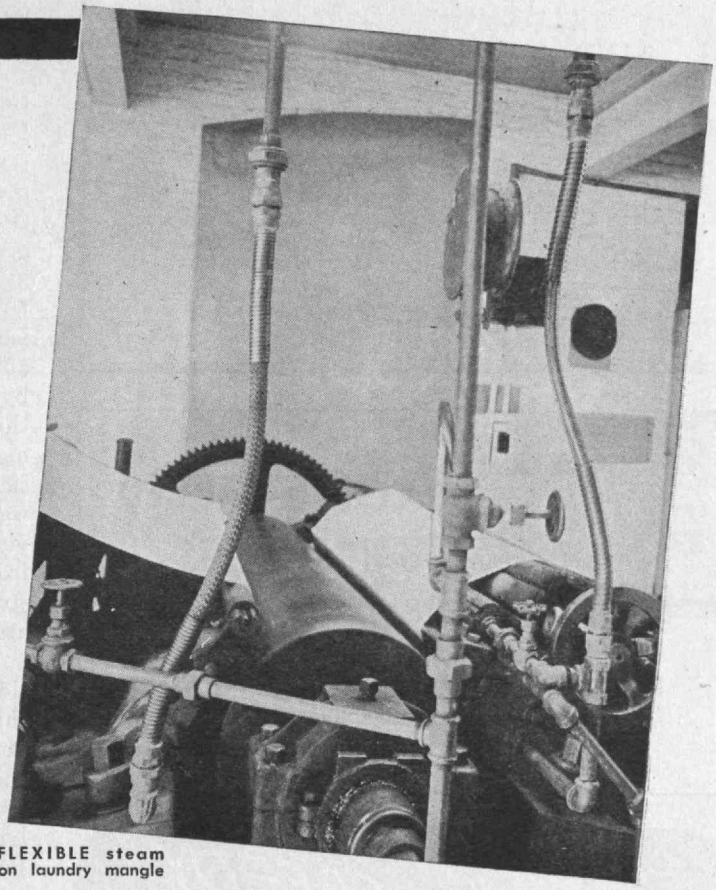
(*Concluded on page 262*)

PENFLEXWELD

CORRUGATED FLEXIBLE ALL-METAL TUBING

for SAFE conveying of your air, oil, steam, gases and volatiles at

High Pressures



PENFLEXIBLE steam line on laundry mangle

PENFLEXWELD is a one-piece, one-material jointless flexible Tubing. Its corrugated construction expands and contracts with temperature alternations . . . provides flexibility and develops high resistance to bursting, cracking and crushing. Finished outside and inside diameters are equidistant from the mid-thickness line of the plain tube wall, providing you with a uniform wall finish that resists fatigue, pressure and prevents seepage.

PENFLEXWELD is a high-pressure Tubing. Standard Braided and Protective Sleeve Types have bursting pressure range from 12,500 psi in 5/32" I.D. to 1,150 psi in 2" I.D. Pressure range may be increased with special braids.

PENFLEX COUPLINGS for PENFLEXWELD TUBING.

SOLSEAL—for general use—designed for service where temperatures do not exceed 250 degrees F.

METSEAL—for high temperatures—a positive metal-to-metal joint. No packing used, metal must break or melt before joint separates.

PENFLEXWELD TUBING and COUPLINGS are described in Bulletin 90 C. Write for it.

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PENFLEX

PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.

7211 POWERS LANE **PHILADELPHIA 42, PA.**

Established 1902

AMERICA'S LAST SUPERLINER

(*Concluded from page 260*)

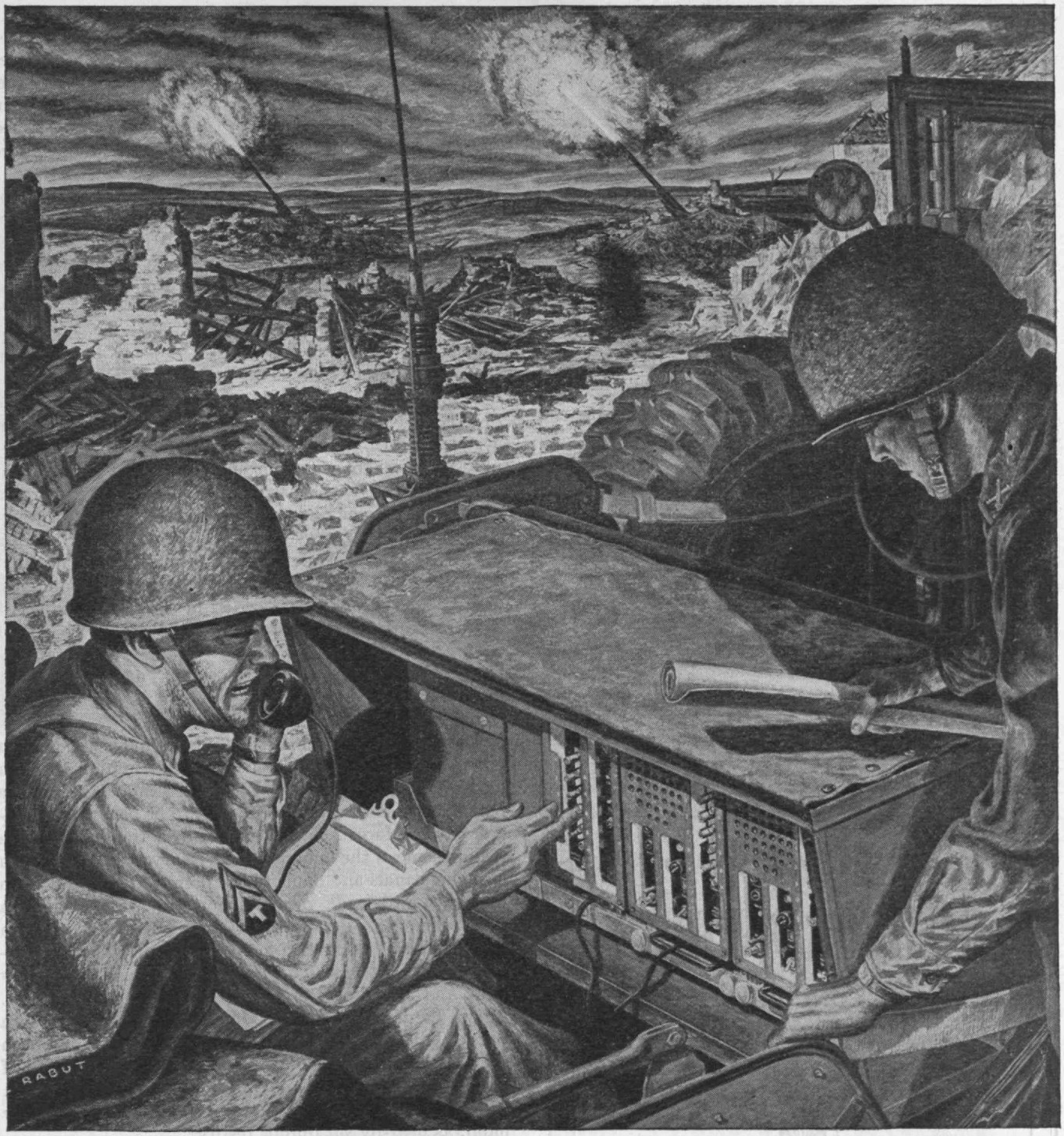
financial panic affecting not only the United States but practically the entire civilized world. This, in combination with the reduction of the subsidy, made it impossible for the line to continue in business. All the ships of the company were sold at auction on April 1, 1858.

In 1859 the *Adriatic* was placed in service for a short time between New York and the port of Aspinwall in Panama. She did not, however, prove profitable in this service and was again laid up. The *Adriatic*'s final appearance in the north Atlantic service was as a ship of the Galway Line, an Irish organization which attempted to operate a fast express service between the port of Galway in western Ireland and Halifax. The *Adriatic* was transferred to British registry before being placed in this service, in which she distinguished herself by some remarkably fast passages. Unfortunately, she was not supported by running mates of equal caliber, so that the line suffered the fate of all transportation organizations which cannot maintain a reputation for reliability, and was forced to suspend service. After the Galway venture the *Adriatic* was laid up for some time in England and was then converted into a sailing vessel, as such making a few voyages from England to San Francisco. Later she became a storage hulk on the west coast of Africa, where she existed at least until the early Nineties.

Though a failure, the *Adriatic* holds a position of considerable interest in the history of the ocean-going steamship. Not only was she the last American vessel built to be the largest and fastest liner on the north Atlantic, but she also had the largest wooden hull ever built for service on that ocean and one of the largest wooden hulls ever built, her size having been exceeded by only one or two Pacific Mail wooden paddle steamers built nearly two decades later for service between San Francisco and Yokohama. The *Adriatic*'s failure was due partly to financial conditions for which her designers were in no way responsible. It was also, however, partly due to the fact that the ship embodied some features which were outmoded and other features which were so new as to be practically untried. The wooden construction of the *Adriatic* was unquestionably a mistake. She could have been built of wrought iron, the iron steamer *Michigan* having been built on the Great Lakes at least 12 years before work was commenced on the construction of the *Adriatic*. On the other hand, the use of a new and untried type of valve gear on engines of unprecedented size no doubt contributed largely to the failure of the *Adriatic*, in view of the fact that her short career was persistently marred by engine trouble.

Though the withdrawal of the United States from the express luxury liner business on the north Atlantic over 80 years ago is almost unquestionably indicative of what might be called a lack of national interest in the merchant marine, it is probably fortunate that we possess no ships of this type at present. After the war, people willing to pay premium rates for fast passage across the Atlantic will almost certainly go by air. The postwar liners with the greatest future will therefore probably be large — but not extremely large — comfortable, moderate-speed ships such as the *Manhattan*, *Washington*, and *America*, unquestionably three of the most successful liners of the late pre-war period.

Every branch of the Armed Services uses the telephone. No. 14 of a series, Field Artillery.



Long Toms—blasting unseen targets—are directed by voices flashing through this artilleryman's radio telephone "switchboard." Using its 10 channels, he connects the commander with spotters up front and in planes; then with battery commanders who focus tremendous firepower. He is helping soften up the long, hard road ahead.

★ ★ ★ ★ ★

Message for YOU!

Every time a 155mm "Long Tom" is fired, it costs Uncle Sam $37.78. Our leaders believe in using vast numbers of costly shells to prevent losing priceless American lives. Help provide the ammunition—*invest all the dollars you can in War Bonds!*

Western Electric

IN PEACE...SOURCE OF SUPPLY FOR THE BELL SYSTEM.
IN WAR...ARSENAL OF COMMUNICATIONS EQUIPMENT.

THE LIMITING RESOURCE

(*Continued from page 235*)

the Gunnison have been made to flow into the broader valley of the Uncompahgre through a six-mile tunnel lying at one point 2,000 feet below the surface, and, in Utah, some of the waters of the Colorado River watershed now reach the region around Provo through a tunnel more than three and one half miles long.

The contrast between the old and the new can perhaps be best summed up with one dramatic illustration. In little more than 10 years and without the slightest strain on her economy, the United States has built dozens of giant dams, three of them — Grand Coulee, Shasta, and Boulder — each exceeding in size the largest masonry structure of antiquity, the great pyramid of Cheops. That pile is estimated to have taken the labor of 100,000 men for a period of 30 years.

It may appear from all this that the way to conquer the desert is: (1) construct a first-class storage and irrigation system, and (2) live happily ever after. History, unfortunately, shows too many examples where it didn't work out that way: Wars, misgovernment, and the inexorable processes of geology have ruined and reruined areas ranging from single farms to entire nations. The too sparing use of water, for example, particularly when it has had opportunity to pick up a heavy load of soluble minerals, may cause salts to be deposited in the soil in sufficient amount to render it unusable. Or the too lavish use of water may raise the water table and also cause salt deposition as well as other troubles, although it must not be imagined that lands ruined by alkali cannot be reclaimed.

The battle against silt is a continuous and heavy burden on most irrigation projects, for rivers running through arid regions poorly covered with vegetation and therefore particularly subject to erosion tend to be heavy silt carriers. Silt can form rich soil; spread over the fields, it can restore some of the minerals lost by harvesting. But it can also clog canals and dams to the point of rendering them useless. Lowdermilk recounts how, in Mesopotamia, a land where the deterioration of the irrigation system paralleled the decline of powerful civilizations, he examined an area in which 12 canals had been successively built and abandoned as they became choked with silt. Again, he describes a valley in the Negeb, the southern part of Palestine, where an old dam 38 feet high had been completely silted in. Above this dam were the remains of three others built later, apparently in an effort to trap silt. When these failed, the topmost reservoir was cleaned by hand, as near-by silt dumps testify.

The Colorado River rivals the Mesopotamian Tigris as one of the heaviest silt bearers in the world, and in the past has made silt removal an annual charge on the irrigation projects of the lower valley. With the construction of Boulder Dam, an immense basin has been formed into which the Colorado can deposit much of its silt burden. If not interfered with, however, the basin will be completely filled with silt within a matter of several centuries, according to estimates.

Yet it is doubtful whether, in the more important cases, natural processes can be given a major share of the blame for the collapse of irrigation systems. In Palestine, a country with a climate much like that of California al-

(*Continued on page 266*)

FIDELITY PACKING BRAIDERS

Speed—15% to 40% higher

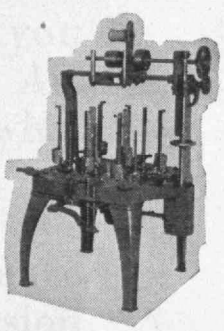
than older types with top weight carriers—these FIDELITY Packing Braiders are equipped with Bottom Latch and Spring Latch Carriers which, together with other construction features, give you the advantages of low power consumption and smooth, vibrationless operation to turn out a uniform, accurate product. 60 to 500 stitches per minute, depending on size and section (round, square or special).

Built in single or multiple head floor units, they are equipped with change gears for different size packings and also for the use of 80% to 100% larger yarn packages—whether asbestos, flax, jute or hemp. Stop motion protection and a choice of models give you a product size range from 1/8" to 1". Other FIDELITY Braiders for nearly every kind of braid.

This combination of speed, economy, control and capacity is characteristic of all FIDELITY Machines, whether made for Braiding, Textile, Wire, Rubber, Clothing or other industries.

★

* The feeling of strength, speed and control is superbly expressed by this stone lion at the south side of the main entrance to Chicago's famed Art Institute.



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FIDELITY MACHINE COMPANY

To Hasten Peace,
Buy More Bonds

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THE LIMITING RESOURCE

(*Continued from page 264*)

though with less general need for supplementing rainfall, a very effective system of irrigation and soil conservation had been evolved by the beginning of the Christian era, through which an area about the size of Vermont was enabled to support a population in the order of 2,500,000. Since much of the cropland was on hillsides where rainfall is heaviest, an elaborate system of terraces had been constructed. Then, as the Romans, Crusaders, and Turks successively fought over and pillaged the country, the continual maintenance work required to keep the terraces, water-storage systems, and canals in working order ceased, and these structures quickly succumbed not to erosion, which was the specific agency, but to neglect. Forests disappeared, a fact which accelerated erosion, and by shortsighted exploitation — for example, a tax on trees — the peasants were discouraged from repairing the damage. By 1850 the population of Palestine had declined to less than 200,000. Today, under the stimulus of new initiative and capital, water and soil are again being handled with intelligence, and the population has passed 1,500,000.

Even in areas where the most easily irrigated lands have long since been put to use, advances in organization and technique continue to make opportunities for the creation of living space out of deserts. Instead of being restricted to small dams, we can now build huge ones and at a far lower cost in man-hours for the results obtained. Instead of building dams for one reason only, we now have multipurpose projects, the first great example of which was Boulder Dam. Here, as in later and in some cases greater examples, one unit furnishes storage space or water for flood control, improved navigation facilities, irrigation, power, and municipal water supplies. Little more than a third of the cost of building recent government projects in our arid areas has been charged against irrigation. Power has paid or will pay for about half, and such services as flood control and navigation improvements have been charged with part of the remainder. Instead of building one dam, we now have the data and engineering skill to integrate entire river systems, squeezing them dry of their possibilities.

Such a program is now going into effect in the 500-mile-long Central Valley of California, where the Sacramento and San Joaquin rivers are being harnessed. The undertaking involves several dams, one of them almost twice as large as Boulder and another not much smaller, and close to 400 miles of projected canals. Primarily, the Central Valley project will irrigate about 2,000,000 acres of rich land for which other water supplies are lacking or insufficient, but it will also supply power to a large and growing market and will regulate river flow. The last aim is in itself multipurposed, for the system of storing water in times of heavy flow and releasing it when the rivers would normally be low reduces flood damage, permits navigation throughout the year, protects industrial and public water supplies, and, by preventing the sea from backing up on the low-lying but extremely fertile delta of the two rivers (as happens whenever the rivers are low), is preserving some 400,000 acres of farmland from ruin. The Bureau of Reclamation believes that water can be

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THE LIMITING RESOURCE

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provided on an economic basis to another 20,000,000 acres in our arid West and is acting on that belief with large-scale construction and still larger plans. If a Missouri Valley Authority becomes an actuality, the areas affected will be measured in terms of European countries. Until the war slowed such efforts, new irrigation projects were burgeoning all over the world — in China, where a few modern projects were beginning to operate; in Arabia, where income from oil concessions has given the government the means to relieve a shaky food situation; in Mexico, where some 10 per cent of the national budget is being allocated to irrigation; and elsewhere.

Unquestionably, these new projects have served mainly, in some countries, to suspend the application of the Malthusian laws for a little while longer. In other regions, the intent and, to a considerable degree, the result have been to raise living standards for the entire population through offering relief from the hazards of dry farming and through increasing the number of people the land can support in comfort and security.

THE INSTITUTE GAZETTE

(*Continued from page 246*)

Visiting Committee Report

THE Committee on the Department of Mathematics * met with Department members on February 25, 1944, at the Department headquarters. So much of the Department's work is related to the war either through instruction of Army students or through research directed to the solution of war problems that the sudden and unpredictable changes in Army and Navy programs require a high degree of adaptability from the staff. During 1943 the enrollment in courses given by the Department first rose to such size as to require more personnel and by 1944 had fallen below normal. It is especially noteworthy that this variation in demand upon the staff has been successfully met by co-operation with other Departments, especially

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* Members of the Committee for 1943–1944 were Philip W. Moore, '01, Chairman, William L. Enfield, '10, H. B. Richmond, '14, Clayton D. Grover, '22, Roy W. Chamberlain, '31, Warner Eustis, and Joseph W. Powell.

THE INSTITUTE GAZETTE

(*Concluded from page 268*)

with the Department of Electrical Engineering. At the time of high enrollment several members of that Department aided in the teaching of mathematics and, with reduced demand, some of the Mathematics staff have taught in the Electrical Engineering group. This is but a single illustration of the co-operative spirit and elasticity of the Department. With it all, the load upon the staff remains heavy, as is generally true in the Institute.

Professor Henry B. Phillips, Head of the Department, submitted a report on the program in applied mathematics which reviewed the pre-war and present work and offered an outline of research with specific examples of the application of this branch of mathematics to engineering and scientific problems. The report included a program for advanced courses in this subject as well as for graduate work and fellowships. In these courses the student is trained in the solution of engineering and scientific problems by the use of mathematics of such high order as to be beyond the experience of the specialists in the fields under study. Applied mathematics furnishes the means by which the most obscure and involved processes of pure mathematics of today become tomorrow the accepted and usual methods of solving engineering and scientific problems. The several engineering and scientific departments of the Institute present an unusually favorable group with which to develop training in the use of applied mathematics.

The Committee found that the Department is well organized and co-operative. They believe that the program for postwar work in applied mathematics has been carefully thought out and recommend its adoption as part of the work of the Department. Consideration should be given to the effect such a program may have upon the budget of the Department and to the best means to be adopted in carrying out the program.

TREND OF AFFAIRS

(*Concluded from page 232*)

Word's Worth

SCIENCE continues to influence man's speech, by adding to or modifying his vocabulary, and not by any means in the wordage of warfare alone. Thus a consulting surgeon of St. Bartholomew's Hospital in London urges an international effort to agree on a standard name for the photograph produced by x-rays, citing the fact that no less than 19 words have been used to signify the negative produced upon a film sensitive to their action.

As reported in *Nature*, only two terms —"x-ray film" and "skiagram" — are regarded by the surgeon as admissible. The first is blackballed as clumsy and as possibly ambiguous because one of the words composing it has alternative meanings. "Skiagram," however, is etymologically apt in being composed of the Greek *skia*, a shadow, and *gramma*, writing; shadow writing is a sensibly close approximation of the negative which x-rays afford and, though architecture once used a cognate name for the vertical section of the interior of a building, is not likely to be easily misinterpreted.

Meanwhile in *Science* Donald R. Griffin of the Harvard Biological Laboratories offers the term "echolocation" for the process of locating obstacles by means of echoes, as is done by blind persons through auditory cues received from sounds of their own making such as the tapping of a cane, by bats through the echoes of the supersonic cry which they emit as needed for orientation, by the steamship captain who relies on the echo of his vessel's whistle in fogbound coastal waters, by the fathometer which times echoes returning from the sea bottom far under a ship's hull, or most recently and most dramatically by the radar instrument which detects far distant aircraft by sending out radiation and registering the energy reflected from them. To work with the noun, Mr. Griffin also advocates the verb "to echolocate."

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The Fund's War Record

FOR FIVE YEARS you have been receiving letters from some member of your class who has signed himself "Class Agent." Some of you know him; some of you do not. At any rate, we thought you'd like to know what some of these men have been doing all this time.

Almost all, of course, have been helping win this war in one capacity or another. Henry Wentworth '05 went to Washington in the War Production Board. So did Ave Stanton '25. Alf Berle is handling '27 from a desk in the Office of Field Service. Lots of others are making equipment — guns, ammunition, ships, and so on. For years George Knight '24 made addressing machines that went "rat-ta-tat-tat." The equipment he makes now sounds like that too, only more so, and they're addressing their messages to Germans and Japs.

But it's some of the others we really want to tell you about. There's Hal Bemis '35, for example. Hal's a lieutenant colonel now. In Algiers they gave him a Legion of Merit, and then we sort of lost track of him until he popped up in the south of France. Went in with his own outfit and the last we heard was heading up for the Siegfried Line.

Major Bob Roulston '34 sweated out a couple of years in Panama with the Air Forces then came back as far as Georgia and only recently got a new assignment nearer home.

Phil Peters, whose Class of '37 has done such an outstanding job, was a Course VI-A man, so he went in for radar! He's an ensign now, but knowing Phil we expect to see gold braid mushrooming on those shoulder boards.

Lieutenant Tom Creamer '40 of the United States Navy has been doing some very important and very secret work in Washington with a bit of sea duty thrown in.

Captain Bill Folberth '41 started out in the artillery and then "decided to be a hero" and took to the air. He doesn't go into too much detail in his letters, but after he finished his flight training, he was assigned to the Air Transport Command. His address is La Guardia Field, but we'll bet he only stops by occasionally to pick up his mail.

Then there's Ensign Jack Tyrrell '43. Jack hadn't even finished indoctrination school before he jumped into a sedentary little outfit known as the "Scouts and Raiders." They're the boys who go in first on a new beachhead and blow up all the underwater obstructions!

And Jimmy Gallivan, '44's agent, is somewhere in Chicago at the moment, learning what radar is all about in the Navy.

Well, that gives you a rough idea, just in case you thought these agents had nothing else to do except sit in steam-heated offices and write you persuasive letters. We thought you'd like to know. It won't be long before you'll be hearing from them again.

TECHNOLOGY MEN IN ACTION

M.I.T. MEN AT WAR

Up to January 15 over 7,147 Institute Alumni, including 28 Admirals, 2 Commodores, 83 Generals, were recorded as being in the active naval or military services of the United Nations. The new additions this month are Brigadier General Herbert B. Loper '21, Brigadier General Urban Niblo '28, Brigadier General Robert R. Neyland, Jr., '21 and Commodore W. Mack Angas '17. There were 130 Alumni who had already been decorated, and 93 Alumni who had made the supreme sacrifice.

Additions and corrections to the listings which have previously appeared, beginning two years ago with the issue of November 1942, will continue to be published in future issues of The Review. As a matter of convenience, promotions and corrections in the rank previously given are grouped under a single heading, "Changes in Rank." The Review Editors are greatly indebted to the many Alumni and other readers who are continuing to co-operate so helpfully in reporting inevitable errors of omission and commission which they note in these listings.

NEW DECORATIONS

1919 Wilson, Henry E., *Capt.*, U.S.A., Bronze Star.

1935 ★Bodell, Brandon B., *Lt.*, U.S.A., Presidential Citation; Purple Heart, posthumously.

1939 Root, Kenneth W., Jr., *Maj.*, U.S.A., Bronze Star — for his leadership and inventive ability in aiding the successful bombing missions of his bombardment group.

1940 **Skeiber, Stanley C., *Capt.*, U.S.A., Purple Heart; Bronze Star — for valorous conduct — France.

1943 Azarigian, Gregory J., *Lt. (j.g.)*, U.S.N., Silver Star — for gallantry and intrepidity in action — Pacific.

2–44 **Freeman, Roger M., Jr., *1st Lt.*, U.S.A., Silver Star; Air Medal and eight Oak Leaf Clusters; Purple Heart.

Phillips, W. John, Jr., *Lt.*, U.S.A., Distinguished Flying Cross; Air Medal and nine Oak Leaf Clusters.

NEW COMMENDATION

1909 Riefkohl, Rudolph W., *Col.*, U.S.A. — "His personal qualifications, quiet and effective attention to duty and manner of performance were of the highest order and the success of the all-important supply functions are a great credit to himself and the Command."

NEW LISTINGS

U.S.A.

1918 Harriman, Vincent S., *Capt.*
1921 Sadler, Walter C., *Lt. Col.*
1925 Booth, Herbert W., *Capt.*
1930 Georgetti, Victor J., *2nd Lt.*
Luce, Gilbert L., *Capt.*
1934 Lewis, Daniel M., Jr., *Lt. Col.*
1938 Einis, Nathan, *Corp.*
Hadley, Robert E., *1st Lt.*
1939 Preston, David R., *S.Sgt.*
Putnam, Henry W., *Capt.*
Solot, Kohlman, *Pvt.*
Vincent, Wilbur D., *Maj.*
1940 Altroggen, Rudolf O., *2nd Lt.*
Pach, Leo, *Pvt.*
Rathje, Robert L., *Corp.*
**Skeiber, Stanley C., *Capt.*
Weiss, Robert M., *1st Lt.*
1942 Stone, Fairfield N., *Pvt.*
Yocum, Dale M., *Capt.*
1943 ★Graham, Everett J., Jr., *Lt.*
Housman, Lewis J., *Pvt.*
Liss, Bernard S., *Pvt.*
Perlmutter, Herman A., *Pvt.*
2–44 Alden, Gardner E., *O.C.*
Boyle, William M., *2nd Lt.*
Hudak, Cornelius L., *T.Sgt.*
Peterson, Robert J., *Pvt.*
10–44 Beckley, Russell M., Jr., *Pfc.*
Bisconer, Reynold M., *2nd Lt.*
Cheek, John H., Jr., *Lt.*
Cloud, Charles E., *A.C.*
Collins, Lathan H., Jr., *Pvt.*
Conover, Clyde S., *1st Lt.*
Desaulniers, George E., *Pvt.*
Domin, Robert A., *Pvt.*
Hagopian, Robert, *Pfc.*
Holland, Howard E., Jr., *2nd Lt.*
Johnson, Melvin A., *2nd Lt.*
Kirby, John J., Jr., *Cadet.*
Lamden, Merton P., *Pvt.*
McEwen, William R., Jr., *A.S.*
Martin, John C., *2nd Lt.*
Mayne, Robert H., *T.4.*
Mela, Richard L., *Pfc.*
Melville, William R., Jr., *Pfc.*
Menghi, Hugh J., Jr., *Pvt.*
10–44 Merrow, Richard J., *Lt.*
Meuer, Paul A., Jr., *Pvt.*
Meyer, Leonard E., *Pvt.*
Mickevicz, Edwin J., *Pvt.*
Miller, Russell T., Jr., *Pvt.*
Mitchell, Frank L., Jr., *Pvt.*
Mitchell, John R., *Pvt.*
Moore, Clinton C., Jr., *A.C.*
Moore, John C., *T.5.*
Moranian, Thomas, *Lt.*
Morelli, Theodore J., *Pvt.*
Morgan, Lyman W., *Pfc.*
Morrell, Bruce E., *Pvt.*
Morton, Charles A., Jr., *Pvt.*
Moschella, Emil P., *Pfc.*
Mullen, Jay, *Pvt.*
Murdock, Warren, Jr., *Pvt.*
Murray, John W., Jr., *Pvt.*
Naas, Edmund C., *A.C.*
Nelson, Dewey H., *Lt.*
Nelson, Donald H., Jr., *T.Sgt.*
Nelson, Harold B., *Pvt.*
Nichols, Theodore F., *A.C.*
Noreen, Russell C., *Pvt.*
Norris, Dwight E., *Pvt.*
Nowak, Joseph A., *A.S.*
Ober, Merton E., Jr., *Pvt.*
Oetter, Donald L., *Pvt.*
O'Leary, Timothy R., *Sgt.*
O'Neill, Barrett, *Pfc.*
Pantazi, Spiros G., *Corp.*
Parmelee, George K., *Pfc.*
Parr, Donley J., Jr., *Pfc.*
Parziale, Alfred J., *Pvt.*
Pasher, William V., *Pfc.*
Patrick, James B., *Pvt.*
Pearson, William A., *A.C.*
Pease, Clement, *Corp.*
Pepin, George R., *Pfc.*
Phillips, James L., *A.C.*
Phillips, Martin M., *Pfc.*
Pick, William, *Pvt.*
Pinel, Roland H., Jr., *Pvt.*
Pope, Leavitt J., *Pfc.*
Powell, James L., *T.5.*
Pratt, Edward B., Jr., *A.C.*
Ransom, Victor L., *Pvt.*
Rediker, Robert H., *Pfc.*
Reece, John W., *2nd Lt.*
Reed, Robert R., *Pvt.*
Reethof, Gerhard, *Pfc.*
Reinhardt, William A., *A.C.*
Revoir, William H., Jr., *Pfc.*
Reynolds, Gibson, *Pvt.*
Ripple, Harold M., *Pvt.*
Rivas, Dayton F., *Lt.*
Robba, Charles R., *Pfc.*
Robertson, James F., Jr., *Sgt.*
Robson, Horace T., *Pvt.*
Rockholz, William L., *Pvt.*
Roggenburg, Stanley L., Jr., *Corp.*
Rosenberg, Edwin A., *Pvt.*
Rosenquest, John B., Jr., *2nd Lt.*
Rowan, Henry M., *A.C.*
Rowe, Robert F., *2nd Lt.*
Sable, Arthur J., *Corp.*
Saxenian, Hrand, *Pfc.*
Schick, Robert B., *Pvt.*
Schilling, Paul K., *Corp.*
Schwartz, Martin D., *A.C.*
Schwarz, Irving L., *Pvt.*
Sciandra, Carmon J., *Pfc.*
Seales, William T., *Pfc.*
Seghers, Paul D., Jr., *Lt.*
Seifert, Charles E., Jr., *Pfc.*
Seitz, Carl R., *T.5.*
Sewall, William D., *A.S.*
Seymour, Robert D., *T.4.*
Shapiro, Mathew M., *Pfc.*
Shea, Paul E., *Pvt.*
Shelby, Albert R., *2nd Lt.*
Sherman, George E., *Pfc.*
Shingleton, Gordon D., *Pvt.*
Shooshan, Robert D., *Pfc.*
Shoulberg, Robert H., *Pfc.*
Siganos, George J., *A.S.*
Sigourney, David W., *A.C.*
Simm, Roy W., *Pvt.*
Simmons, Harold E., *Pvt.*
Singer, Arnold M., *2nd Lt.*
Sixsmith, John T., *Pfc.*
Slawson, Hugh M., Jr., *A.S.*
10–44 Slusser, Robert P., *Pfc.*
Smith, Arnold H., *2nd Lt.*
Smith, Charles H., Jr., *Pfc.*
Smith, Richard H., *2nd Lt.*
Smith, Roger D., *Pfc.*
Smith, Stanley G., *Pfc.*
Smith, Thornton E., *Pvt.*
Smock, Stanley C., Jr., *Pfc.*
Solow, Robert J., *Pvt.*
Sonnenblick, Jack E., *Pvt.*
Souza, Richard W.
Spear, Warren M., *Pvt.*
Sprankle, Edwin W., *Pvt.*
Spruill, Cecil E.
Stahlman, William D., *Pfc.*
Starrett, Philip S., *Pfc.*
Stebbins, George H., Jr.
Stedje, John F., *2nd Lt.*
Steffens, Charles, Jr., *Pvt.*
Steiger, Walter R., *Pvt.*
Steinbach, John F., *Pvt.*
Steiner, Harold A., Jr., *2nd Lt.*
Sterling, A. Graham, Jr., *O.C.*
Stetson, Richard A., *Pvt.*
Stevenson, Robin, *2nd Lt.*
Stiles, George J., *Pfc.*
Stockbridge, Bruce W., *Pvt.*
Stout, Joseph D., Jr., *A.C.*
Stroud, Walter L., *Pfc.*
Struminski, Thomas R., *O.C.*
Sundback, Paul P., *Pfc.*
Sundblad, Robert L., *Pvt.*
Sweeney, Richard M., *Pvt.*
Sylvander, Frederick B., *Pfc.*
Taylor, David W.
Taylor, James T., *Lt.*
Teets, Pierre E., Jr., *2nd Lt.*
Thirkield, Robert D., *A.C.*
Tompkins, Denzel H., *1st Lt.*
Townsend, Edward M., *A.C.*
Travers, Harvey C., *Sgt.*
Tucker, Donald A., Jr., *Pfc.*
Turner, Ralph W., Jr., *Pvt.*
Ullman, Joseph L., *Pvt.*
Ulmer, James G., Jr., *Pvt.*
van der Voort, Henry F., 3rd, *2nd Lt.*
Van Greenby, Donald M., *Pvt.*
Van Hoy, Jack W., *Pvt.*
Varner, Arnold M., *Pfc.*
Vatis, Anastassios T., *Pvt.*
Von Muller, Francis, Jr., *T.5.*
Ward, Jasper D., 3rd, *2nd Lt.*
Washburn, Stewart A., *Pvt.*
Weaver, Richard E., *Pfc.*
Weeks, Norman E., Jr.
Weeks, Walter J., *Pfc.*
Welti, George R., *Pvt.*
Wenrich, Homar F., *Pfc.*
Werner, George H., *Corp.*
White, Brooks S., *T.3.*
White, Robert M., *1st Lt.*
Whitmore, Charles B., *A.S.*
Whittemore, John P., *T.5.*
Widelitz, Milton A., *Corp.*
Willard, Frederick E., *Pvt.*
Williams, Philip H., *Cadet.*
Wilson, John M., *Pvt.*
Wilson, Milo V., Jr., *Pfc.*
Wilson, Robert E., *Pvt.*
Wiswell, Charles M., *Pfc.*
Wolff, Marcus A., Jr., *A.S.*
Wong, Arthur C., *Lt.*
Wong, George W., *Pfc.*
Yeates, John S., *Pfc.*
Yocom, John E., *Pfc.*
Ziebarth, Charles W., *Pvt.*
Zimbel, Norman S., *Pfc.*
Zulon, John A., *T.5.*
Zwemer, Howard A., *2nd Lt.*

U.S.N.

1921 Frost, Robert B., *Lt.*
1930 Waite, William H., *Lt. (j.g.)*
1931 Salter, Wilfred H., *Lt.*
1936 Kuryla, Michael A., *Lt. (j.g.)*
1940 Jahnke, Noble W., *Lt.*
1942 Davis, Norman L., *Sp.1c.*
Richmond, Robert P., *S.2c.*
St. Jean, Lloyd E., *Lt. (j.g.)*
1943 De Frate, Louis A., *Ens.*
1943 Finney, Frank R., *Ens.*
Van Burgh, Lisle, Jr., *Lt. (j.g.)*
2–44 Cravitz, Leo, *Ens.*
Hunn, John L., *Ens.*
10–44 Aldrich, Harl P., Jr., *A.C.*
Archibald, Parker D., *Aer.M.2c.*
Arnstein, Norman M., *R.T.3c.*
Artim, Edward, *Ens.*
Bartlett, Stephen O.
Binns, George H., *Mid.*
Bode, William G., *Ens.*
Bohn, Edward H., Jr., *Ens.*
Brindle, John H., *Ens.*
Brown, Harold, *Mid.*
Brumley, Corwin, H., *A.S.*
Byrne, James B., *A.S.*
Carlson, Leonard H., *Ens.*
Church, William S., *Ens.*
Cobb, Albert W., *Ens.*
Cooper, John T., *S.1c.*
Corbett, Albert D., Jr., *Ens.*
Dennison, Joseph D., Jr., *A.S.*
Duffy, Bernard J., Jr., *Ens.*
Eitingon, Mark, *S.2c.*
Ericsson, Walter R., *Ens.*
Ferris, Cyrus Y., Jr., *A.S.*
Fischer, George H., *S.1c.*
Flader, Deane F., *Ens.*
Fornwalt, Max B., *Ens.*
Gibson, William C., *S.2c.*
Goddard, Vincent P., *S.1c.*
Gould, William H., *S.1c.*
Grafe, Ernst O., *Ens.*
Grosjean, Warren J., *A.C.*
Hamaker, Richard F., *Ens.*
Heaton, Robert L., *Ens.*
Herbert, Robert N., *Ens.*
Heuer, Charles H., *S.1c.*
Hewitt, George F., *Ens.*
Hollister, Harold H., *Ens.*
Jansen, Howard J., *Mid.*
Jordan, J. Franklin, *S.1c.*
Keating, Kenneth L., *Mid.*
Kiefer, Paul J., Jr., *Mid.*
Klopfer, Edward L., *Mid.*
Koiner, Junius S., Jr., *Mid.*
Laferty, Robert W., *A.S.*
Lambert, Kenneth A., Jr., *Mid.*
Laube, Theodore C., *Ens.*
Laurenzano, Frank M., *Ens.*
Lawrence, Albert W., Jr., *Ens.*
Lawson, Thomas A., *Ens.*
Leffler, John M., *S.1c.*
Levine, Lawrence J., *Lt.*
Lockwood, Howard S., *S.1c.*
Long, Theodore M.
Lynch, Charles V., Jr., *A.C.*
McCarthy, James J., *R.T.3c.*
McCurdy, Harry B.
McDermott, Daniel S., *Ens.*
McKinley, Francis J., *A.S.*
McLaurin, King H., Jr., *Mid.*
Mandeles, Stanley, *Ens.*
Maxwell, Donald O., *A.S.*
Mayer, Bruce H., *A.S.*
Meisner, Edward O., *Ens.*
Meyerhoff, Robert E., *A.S.*
Mohrey, Raymond T., *S.2c.*
Moore, Ben W., *Mid.*
Moore, Henry B., *Mid.*
Moore, John M., Jr.
Moore, William J., Jr., *A.S.*
Motter, John W., *S.K.V.3c.*
Mullan, William E., Jr., *A.C.*
Mullholland, James S., Jr., *A.S.*
Munroe, William R., Jr., *Ens.*
Neyman, Robert L., *Comdr.*
Niederberger, Robert B., *Mid.*
Nolan, Frank W., Jr., *Mid.*
Oldfield, James C., *Lt.*
Orth, Edward A., *Mid.*
Peakes, Edmund W., *Mid.*
Pelosi, Michael H., Jr., *Ens.*
Peters, Theodore, Jr., *Ens.*
Peters, Wilbur R., Jr.
Phelan, Dennis J., *Mid.*
Pigford, Thomas H., *Ens.*
Plaut, Arthur, Jr., *A.S.*
Pohanka, Frank S., Jr., *Mid.*
Porson, Allan B.
Porter, William H., *Mid.*
Pressey, Donald R., *Mid.*

10–44 Priestley, Robert J., *Ens.*
Prosser, David S., Jr., *Mid.*
Pugh, Benjamin F., *S.1c.*
Quisenberry, George E., Jr.
Rangnow, William A., *A.C.*
Reigart, John M., *Lt.*
Reppucci, Albert C.
Richardson, Lincoln D., *A.R.T.3c.*
Ricker, Harrington, *R.T.2c.*
Robinson, Lewis A., *Ens.*
Roddis, Louis H., Jr., *Lt. (j.g.)*
Romanos, Arthur R., *A.S.*
Rosar, Michael T., *S.1c.*
Row, Walter A., Jr., *Ens.*
Rueckert, John J., *Mid.*
Sawyer, William T., *Lt. Comdr.*
Schierbaum, Frederick C., *R.T.3c.*
Schultz, Clarence W., *Ens.*
Seward, Nym K., *Ens.*
Sheffler, Marcus A., *Ens.*
Simon, Albert E., Jr., *Ens.*
Simpson, Charles M., 3rd, *A.S.*
Sluis, Joost, *S.2c.*
Smith, Deming W., *S.1c.*
Smith, Robert O., *Ens.*
Sollenberger, Charles L., *A.S.*
Solverson, Robert R., *S.1c.*
Soule, Harvey F., *Ens.*
Speckmann, Robert E.
Sproul, John B., *Ens.*
Stevenson, John E., Jr., *Ens.*
Stoutenburgh, Joseph S., *Mid.*
Stromsted, Thor K., *A.C.*
Swan, Hobart L., *A.C.*
Swensson, Gerald C., *A.S.*
Sykes, Robert F., *A.C.*
Tamblyn, Robert S., *S.2c.*
Thomas, Charles S., Jr., *Lt.*
Tillson, Henry C., *A.S.*
Tome, John M., *Ens.*
Tower, Archie, *Lt.*
Troutman, Leslie E., *Lt.*
Truxal, John G., *Ens.*
Turner, Judith B., *Ens.*
Uretzky, Jack L.
Van Rennes, Albert B., *A.S.*
Walker, John P., Jr., *Ens.*
Walsh, Gregory F., Jr.
Walsh, John A., *Mid.*
Wellenkamp, Paul D., *S.1c.*
White, John W. L., *A.S.*
Wiedmann, John A., *Ens.*
Wilkinson, Roland F., *Mid.*
Williams, John N., *Mo.M.M.2c.*
Wilson, C. Townsend, 3rd, *Ens.*
Woolston, John
Wright, William E., *Ens.*
Young, Robert M., *Pho.M.3c.*
Zirin, Louis I.

U.S.C.G.

2–44 Goat, W. Richard, *Cadet*
10–44 Naab, Joseph W., *Lt. Comdr.*

U.S.M.C.

1936 Rulon, Morgan C., *1st Lt.*
10–44 Murchison, Clinton W., Jr., *Pvt.*
Spear, Lawrence W., *Pvt.*

CHANGES IN RANK

U.S.A.

1919 Grayson, Louis J., *Maj.* to *Lt. Col.*
1920 Rubin, Samuel, *Lt. Col.* to *Col.*
1921 Loper, Herbert B., *Col.* to *Brig. Gen.*
Neyland, Robert R., Jr., *Col.* to *Brig. Gen.*
1922 Styer, Wilhelm D., *Maj. Gen.* to *Lt. Gen.*
1923 Hassler, Frank R., *Maj.* to *Lt. Col.*
1925 Spiker, Samuel R., *Capt.* to *Maj.*
1926 Pickett, Charles M., *Capt.* to *Maj.*
1928 DeGraff, Barth R., *Maj.* to *Col.*
Niblo, Urban, *Capt.* to *Brig. Gen.*
1930 Dixon, Marvin H., *Lt. Col.* to *Col.*
Sahud, Eugene L., *Pvt.* to *2nd Lt.*
1929 Shriver, Raymond H., *T.5.* to *Lt.*
1932 Poinier, Norman E., *Capt.* to *Lt. Col.*
1933 Way, Robert F., *1st Lt.* to *Capt.*
1934 Leighton, Harold C., *Capt.* to *Maj.*
Shepherd, Daniel F., *Maj.* to *Lt. Col.*
1935 Bailey, Richard F., *Lt.* to *Capt.*
Woll, Edward, *Lt.* to *Capt.*
1936 Reday, Ladislaw, *1st Lt.* to *Capt.*
Sylvester, Walter G., *Maj.* to *Col.*
1938 Phillips, John J., Jr., *Lt.* to *Capt.*
1939 Hamilton, C. Watson, *2nd Lt.* to *1st Lt.*
Root, Kenneth W., Jr., *Capt.* to *Maj.*
1940 Magee, James G., *Lt.* to *Maj.*
1941 Berman, Irving, *Lt.* to *Capt.*
Keith, Walter P., Jr., *Lt.* to *Capt.*
1942 Andrew, Laurence C., Jr., *Pvt.* to *Lt.*
Myrick, John B., Jr., *Pvt.* to *Sgt.*
1942 Van Teylingen, Arie A., *2nd Lt.* to *Capt.*
1943 Netsch, Walter A., Jr., *Pvt.* to *Corp.*
2–44 Eno, Robert F., *Pvt.* to *2nd Lt.*
Lewis, James E., Jr., *A.C.* to *2nd Lt.*
West, Alden A., *A.C.* to *Lt.*
10–44 Bossi, Enea W., *Pvt.* to *Sgt.*
Dengler, Carl E., *Pvt.* to *2nd Lt.*
Donahue, Joseph M., *Cadet* to *Lt.*
Frodey, Ray C., *Pvt.* to *2nd Lt.*
Hanson, Potter, *Pvt.* to *Corp.*
Horn, Robert J., Jr., *Pvt.* to *Sgt.*
Kautz, William H., *Pvt.* to *Corp.*

U.S.N.

1917 Angas, W. Mack, *Capt.* to *Commo.*
Hunt, Gilbert A., *Comdr.* to *Capt.*
1920 Marron, Adrian R., *Comdr.* to *Capt.*
1922 Holmes, Phillip B., *Lt.* to *Lt. Comdr.*
1926 Cotton, Clement F., *Lt. Comdr.* to *Capt.*
1929 Couper, B. King, *Lt.* to *Lt. Comdr.*
1930 Cook, John W., Jr., *Lt.* to *Lt. Comdr.*
1931 Graesser, Walter M., *Lt. Comdr.* to *Comdr.*
1934 Hiemenz, Herbert J., *Lt. Comdr.* to *Comdr.*
Stein, Laurence B., *Ens.* to *Lt. (j.g.)*
1935 Atkinson, Archibald H., *Lt.* to *Lt. Comdr.*
Hatch, Frank R., *Ens.* to *Lt. (j.g.)*
1936 Johnson, Stanley T., *Ens.* to *Lt. (j.g.)*
Sharpe, Lawrence W., *Lt.* to *Lt. Comdr.*
1938 Laurenti, Luigi M., *S.M.2c.* to *S.M.1c.*
Vasalle, Bronald J., *Ens.* to *Lt. (j.g.)*
Worthen, Welles, *Ens.* to *Lt. (j.g.)*
1939 Herr, Donald L., *Lt. (j.g.)* to *Comdr.*
Stephens, Herbert L., *Ens.* to *Lt. (j.g.)*
1941 Corry, John, *Lt.* to *Comdr.*
1942 Harvey, Herbert F., *Ens.* to *Lt. (j.g.)*
1943 Azarigian, Gregory J., *Ens.* to *Lt. (j.g.)*
Fitzpatrick, Leo A., *Ens.* to *Lt. (j.g.)*
Slifer, George A., Jr., *Ens.* to *Lt. (j.g.)*
Steinhauer, Henry, Jr., *Ens.* to *Lt. (j.g.)*
Swinton, David B., *Ens.* to *Lt. (j.g.)*
Wadleigh, Kenneth R., *Ens.* to *Lt. (j.g.)*
2–44 Jakel, Arnold E., *Lt.* to *Lt. Comdr.*
10–44 Furlong, Donald, *Lt.* to *Lt. Comdr.*
Guptill, Frank E., Jr., *S.2c.* to *A.R.M.3c.*
Keefe, John R., *Ens.* to *Lt. (j.g.)*

U.S.C.G.

1942 Oren, John B., *Lt. Comdr.* to *Comdr.*

U.S.M.C.

1935 Porter, Malcolm A., *2nd Lt.* to *1st Lt.*

RANK NOT PREVIOUSLY LISTED

1931 Peery, George A., *Lt. Comdr.*

CASUALTIES

1934 ★Battit, Beshara E., *Lt.*, U.S.A. — European theater.
1935 ★Bodell, Brandon B., *Lt.*, U.S.A. — Died of wounds received in action — France.
1936 ★Knight, Edmund C., *Capt.*, U.S.A. — France.
1939 †Magnuson, Charles M., *Pvt.*, U.S.A.
1941 ★Heist, John C., *Maj.*, U.S.A. — France.
*Henry, Richard K., Jr., *Ens.* U.S.N. — plane crash — Vernalis, Calif.
1943 ★Graham, Everett J., Jr., *Lt.*, U.S.A. — Leyte.
2–44 *Shepard, Henry C., *2nd Lt.*, U.S.A. — plane takeoff crash — China.
10–44 *Burke, James C., *2nd Lt.*, U.S.A. — plane crash — Nebraska.
1946 ★Reeves, Willis W., Jr., *Lt.*, U.S.A — France.

CLASS ANALYSIS of M.I.T. MEN AT WAR

Class	*Army*	*Navy*	*U.S.C.G.*	*U.S.M.C.*	*Allied Nations*	*Total*
1895	1		1			2
1896	2		1			3
1897	1		1			2
1898	2	1				3
1900	1					1
1901	2	2				4
1902	5	1	1			7
1903	2					2
1904		1				1
1905	5	6				11
1906	6	3				9
1907	8	5				13
1908	4	6				10
1909	9	4	1			14
1910	19	7				26
1911	18	2	1			21
1912	12	6				18
1913	14	5			2	21
1914	14	7		1		22
1915	13	7			1	21
1916	26	10	1		1	38
1917	37	32	2		1	72
1918	27	12				39
1919	22	12				34
1920	32	32		2		66
1921	104	41			1	146
1922	97	49	1	1	1	149
1923	91	53	2	1	3	150
1924	71	48		1	1	121
1925	73	45	1	1	1	121
1926	71	48	1	1	1	122
1927	74	33		1	1	109
1928	86	63			4	153
1929	74	45	3		2	124
1930	114	61		1	1	177
1931	120	63	1	2		186
1932	142	75	3	1	3	224
1933	149	79	2	7	3	240
1934	166	73	2	4	3	248
1935	167	54	2	3	2	228
1936	144	76	3	4	5	232
1937	165	60		2	2	229
1938	190	83		3	1	277
1939	204	83	2	3	6	298
1940	266	139	5	6	8	424
1941	293	188	5	8	2	496
1942	414	213	3	9	13	652
1943	206	196	4	12	6	424
2–44	322	159	4	8	4	497
10–44	417	207	4	18	9	655
1946	5					5
TOTALS	4,507	2,395	57	100	88	7,147

CORRECTION — CASUALTY LIST

In the January issue, we erroneously published the death of John F. Burke, *2nd Lt.*, U.S.M.C. We confused "J. F. Burke" with "J. C. Burke," both members of the Class of 10–44.

James C. Burke, Jr., a *2nd Lt.* in the Air Forces was killed in a crash of an Army transport plane in Nebraska last August.

★ Killed in Action † Missing in Action ‡ Prisoner of War * Died or killed in Service ** Wounded

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

Technology Club of Chicago

On November 28 a luncheon meeting was held at the University Club with Henry T. Heald, President of the Illinois Institute of Technology, as guest speaker. H. E. Lobdell '17 was an unexpected but heartily welcomed visitor. Dr. Heald gave an instructive account of the operation of engineering schools under war conditions and added a brief outline of the problems to be met when the armed forces return and resume their schooling. Dean Lobdell responded with his dry witticisms, mentioning the opinion of both students and faculty on the character of deans.

We believe that you will like to look through this partial list of attendance to see which of your friends were on hand: Lonsdale Green '87, Richard E. Schmidt '87, A. F. Woltersdorf '93, C. E. Chase '03, J. B. Finnegan '04, E. G. Allen '05, T. B. Black '09, H. S. Pardee '09, F. W. Bucknam '16, J. I. Connolly '16, E. D. Hale '16, E. P. Brooks '17, H. E. LaMere '17, Sherry O'Brien '17, W. H. Robertson '18, S. P. Griffin '20, E. G. Farrand '21, H. N. Hallett '21, L. R. Janes '21, F. M. Post '21, A. J. R. Houston '22, P. L. Coleman '23, V. V. Cocks '23, H. S. Davis '24, D. H. Keck '25, J. G. Praetz, Jr., '28, J. A. Leighton '30, Beverly Dudley '35, M. M. Kuban, Jr., '37, Goodwin de Raismes '37, and Bonner Hoffmann '40. — ELMER D. SZANTAY '35, *Secretary*, Sandee Manufacturing Company, 3945 North Western Avenue, Chicago 18, Ill.

Detroit Technology Association

At the second fall meeting on December 12 the Association elected new officers for the 1944–1945 year as follows: President, Allyne C. Litchfield '17; Vice-president, David M. Sutter '26; Treasurer, Thomas F. Morrow '35; Secretary, Douglas B. Martin '25; Honorary President, John E. Longyear '26. We were most fortunate in having as guest speaker an economic advisor to the United Automobile Workers, C.I.O., who spoke on what the union has to offer now and in postwar work. His speech was highly informative as well as provocative in reference to the union's thoughts on the employment situation. After the main speech, we as usual threw the meeting open to discussion, and a very interesting question-and-answer period ensued. In our opinion, other Technology clubs should endeavor to get a similar type of speaker for an experience which will be most educational. — DOUGLAS B. MARTIN '25, *Secretary*, 6501 Harper Avenue, Detroit 31, Mich.

Technology Club of Hartford

On December 5 the Club held its first dinner meeting of the season at the Rockledge Country Club in West Hartford. President Tuttle '21 presided over the business meeting, which included a report from Malcolm Wight '06, representative on the Alumni Council, as well as a report from George Mylchreest '10, chairman of the postwar employment committee. Mr. Mylchreest reported that R. J. Ross '06, F. E. Stern '16, C. H. Chatfield '14, M. G. Wight '06, J. P. F. Pilkington '27, and Dr. S. H. Osborn '15 had agreed to serve on his committee and that a meeting had been held prior to the dinner. For the present, the committee stands ready to render all possible assistance to returning Technology men and will arrange to co-operate with other local agencies. A more detailed program will be developed as required.

After the business meeting and a fine dinner, Captain Herman Schendel, our guest speaker, was introduced. He showed a movie on the training of dogs and then spoke on the subject, "Dogs in Action," illustrating his remarks with the aid of four of his trained dogs, also our guests for the evening. Captain Schendel indicated the satisfaction and pleasure to be derived from owning a well-trained dog and then went on to outline the great service being rendered by the war dogs and the methods of training them. His talk was very well received by all as evidenced by the many questions asked at its conclusion. Thirty-six members and guests attended this meeting. — LOUIS J. PROULX, JR., '36, *Secretary*, 31 Wells Road, West Hartford 7, Conn.

M.I.T. Club of the Province of Quebec

On December 13 the Club held its second meeting of the year at a luncheon at the Windsor Hotel. Thirty men attended. Under the chairmanship of Henri Gaudefroy '34, who is assistant to the dean at the École Polytechnique de Montreal, Huet Massue '15 gave a very interesting talk with slides on the results of his study on the Canadian population. Mr. Massue is an engineer with the Shawinigan Water and Power Company. The information which he produced so graphically showed population trends back seven and eight decades and produced information that is very valuable in planning many aspects of Canadian development.

In order to maintain the activities of the Club, it was voted to charge annual dues of two dollars per member; notices to this effect will be sent with the announcement for the next meeting, which, it is hoped, will be held in February. The list of Alumni in this area now totals 170. Of these about 125 live in or near Montreal. With the co-operation of members and of the Alumni Association, the names and addresses are being constantly revised, and changes are frequent. In a recent mailing to the members a tabulation of all names and addresses and telephone numbers available was given. Members are asked to co-operate in informing the Secretary of corrections or changes and additions. — STANLEY C. DUNNING '17, *Secretary*, Canadian Waterpaints, Ltd., 2100 St. Patrick Street, Montreal 22, Province of Quebec, Canada.

New Haven County Technology Club

The second meeting of the year was held at the Hotel Elton in Waterbury on December 12. It was the brass city's first opportunity in several years to make the Club welcome. Waterbury members were only too glad to assume this responsibility because it shifted the burden of travel from themselves to the members living in other parts of New Haven county.

We were privileged in having Henry B. Kane '24, director of the Alumni Fund, as speaker. Mr. Kane's lavishly illustrated talk on many varieties of birds, bugs, and beasts revealed many interesting natural phenomena which gave the mechanically minded listeners a more profound appreciation of the marvels of nature. He preceded his main topic with a few informal remarks concerning the experiences and accomplishments of Technology men in the armed forces. We are indeed grateful to Mr. Kane for making possible a successful meeting.

The following members were present: J. Russell Putnam '01, John C. Bradley '07, Walter P. Green '12, Harold G. Manning '12, Leland V. Clark '15, Forrest G. Purinton '15, Stuart M. Boyd '18, Harry H. Mardoian '19, Joseph L. Hetzel '23, Walter R. Weeks '24, Natale Gada '26, William W. Young '29, John E. Kearns '32, Howard P. Sharp '34, Oscar E. Eckblom '35, Albert I. Blank '37, Robert S. Cady '39, Edwin R. Hahn '40, Judson M. Rogers '40, and Gideon Hofmann '42. — LAWRENCE B. GREW '27, *Secretary*, Southern New England Telephone Company, New Haven, Conn.

Technology Club of New York

December 8 was the date of our fall smoker. Over 150 members and guests were treated to an extremely interesting illustrated talk by our guest speaker, Chick Kane '24. In a series of pictures that can only be described as remarkable, Chick showed us how with a lot of patience and a high-speed camera he had "shot" wild life. We hope that he can come back to us again and show us more of the same thing. The refreshment period of beer and sandwiches was pleasantly interrupted by our toastmaster, George Dandrow '22, introducing Ping Loo '16, who returned to China in 1920. This is the first time he has been back to the States, and his extemporaneous talk on present conditions and his willingness to answer the questions put to him were appreciated by the entire group. Jack Teeter '22 and Frank Gage '22 led the singing and contributed several specialties of their own.

An unscheduled bit of comedy occurred earlier in the evening. A sizeable group had gathered to have a little libation and dinner with our guest speaker. Bill Neuberg '17

had donned a white waiter's jacket to buy and serve drinks for the crowd when he was greeted by one of his neighbors from exclusive Darien and a Williams College Man. "How come?" says the W.C.M. "Oh," says Bill, "business isn't so good, so I work here nights." Whereupon the Williams College Man said that he would resign — just couldn't bear to see Bill reduced to such circumstances.

On December 14 a farewell luncheon was held by the Club for R. E. Wilson '16 in honor of his appointment as chairman of the board and chief executive officer of the Standard Oil Company of Indiana. Some 45 guests were present, representing classes from 1886, with J. C. Duff, to 1940, with Ensign George Morrow. In addition, we were especially pleased to have from Boston J. R. Macomber '97 and also Frank P. Scully '15, and from Newburgh, T. C. Desmond '09. L. B. Davis '22 provided a brief and, in several instances, very humorous review of the career of the guest of honor, with special emphasis on the oil industry. A suitably bound memento of the luncheon, duly autographed on parchment by all the guests, was presented to the guest of honor by President Dandrow for the Club. Copies of the keepsake, which included a letter of greeting from Dr. Compton, were distributed to each guest. Dr. Wilson responded with several humorous anecdotes of his career.

The following have been admitted to membership: William C. Gilman '22, engineer, 55 Liberty Street, New York City, and Harold J. Ryan '26, H. J. Ryan, Inc., 101 Park Avenue, New York City. Applications have been received from: Isidore Loss '22, Ingersoll Rand Company, 11 Broadway, New York City, and John L. Vaupel '22, manager, The Phoenix Bridge Company, 30 Church Street, New York City. — WILLIAM D. NEUBERG '17, *Secretary*, 24 East 39th Street, New York, N.Y. WILLIAM L. KEPLINGER, JR., '24, *Publicity Committee*, care of Johns-Manville Corporation, 22 East 40th Street, New York, N.Y.

M.I.T. Club of Northern New Jersey

A committee headed by Ray Brooks '17, vice-president in charge of program, has been working enthusiastically on plans for a big meeting to be held on or about March 15 in commemoration of the 10th anniversary of the founding of our Club. Thus far it may be revealed that Dr. Compton has consented to come and address us (barring unusual circumstances). In addition, we expect to have another well-known speaker on the program. This meeting should be one of special appeal to the entire membership. More details will be given on the usual notice, which will be mailed to our members about two weeks in advance of the meeting. Keep an eye on your mailbox. — RALPH S. WETSTEN '21, *Secretary*, 87 Passaic Avenue, Summit, N.J.

M.I.T. Club of Western Pennsylvania

On the 6th of December, 33 members and three guests gathered at the University Club in Pittsburgh for the second regular buffet dinner meeting of the season. After the usual good dinner Joseph H. Cox '23, President, opened the formal portion of the meeting by reading a letter from our newly appointed representative on the Alumni Council, T. E. Shepherd '22, who rendered a very concise review of the proceedings of the 241st alumni meeting. In order that this Club may be prepared to co-operate with the Placement Bureau at Technology in securing jobs for returning veterans, President Cox continued previous efforts in this direction by appointing Harold L. Lang '09 as chairman of a committee to be chosen to achieve this end.

The Club was fortunate, indeed, to have as its guest speaker Henry B. Kane '24, who adeptly presented an inspiring talk on "The Wild World," illustrated with colored slides drawn from his broad experience and success as a nature photographer. Everyone enjoyed hearing the record of the new Technology song, "Sons of M.I.T.," which Mr. Kane gave us. In conclusion, Raymond G. Lafean '19 read the proposed constitution and by-laws which had been prepared by the executive committee. Immeasurable gratitude is due members of this body for having given so freely of their time and effort to produce a document which will be most useful to the Club in the future as a simple, workable law. A resolution was unanimously approved to distribute copies to all members to facilitate further consideration at the next meeting. — STANLEY C. JOHNSON '39, *Secretary*, 47B Woodlawn Terrace, Clairton, Pa.

Washington Society of the M.I.T.

The Society held its pre-Christmas meeting on December 14 with 93 members attending. The following were guests of the Society: Paul M. Chalmers, Assistant Director of Admissions; Jerome C. Hunsaker '12, Professor of Mechanical and Aeronautical Engineering; Pellian Teh Che Mar '15, a rear admiral in the Chinese Navy; Frank T. Yeh '14, a captain in the Chinese Navy; and Colonel H. C. T. Han of the Chinese Army. The guest speaker was Kan Lee, commercial counselor of the Chinese Embassy, whose doctorate was received from Harvard University in 1927.

Dr. Lee's subject was "China and the Western Technology." He traced the history of China for the past 150 years and discussed the technological changes which have taken place since the Industrial Revolution. The first use of Western technology by the Chinese was for the production of armaments of war. It was not until the beginning of the 20th Century that much technological progress was made in China. Dr. Lee discussed his government's policy of sending students to the United States for training. He indicated that technological students will play a major part in the reconstruction of China after this war, but warned that China must also train its people along other than technical lines or an unbalanced situation would result. A very interesting off-the-record discussion of the Chinese problem followed Dr. Lee's talk.

Technology men in attendance were as follows: 1889: G. W. Stone; 1890: J. G. Crane, W. B. Poland; 1891: W. B. Douglass; 1892: B. P. Du Bois; 1893: G. W. Stose; 1896: W. E. Haseltine; 1897: P. L. Dougherty, B. A. Howes; 1898: Martin Boyle; 1900: M. L. Sperry, C. H. Stratton; 1902: G. E. Marsh; 1903: W. L. Cook; 1904: M. L. Emerson, A. M. Holcombe, William McEntee, F. W. Milliken, G. H. Shaw, G. N. Wheat; 1906: R. R. Patch; 1909: E. D. Merrill, B. A. Robinson; 1911: D. P. Allen, C. G. Richmond; 1912: J. C. Hunsaker, A. M. Pederson, R. E. Wilson; 1914: F. T. Yeh; 1915: A. D. Beidelman, P. T. Mar; 1916: W. H. Blank, F. P. Upton; 1918: H. D. Manuelian; 1919: A. H. Blake, L. J. Grayson, M. P. Smith; 1920: John Nolen, Jr.; 1921: L. W. Conant, L. L. Lesser; 1922: H. H. Fisk, W. K. MacMahon, C. A. Moore, J. R. Morton, Jr., R. K. Thulman; 1923: J. D. Arthur, Jr., H. L. Bond, G. H. Hurley, F. J. Travers; 1924: W. V. Cash, J. E. Jackson, L. F. Porter, R. P. Schreiber, W. W. Sturdy; 1925: H. E. Weihmiller; 1926: S. J. Cole, W. R. Franklin, R. W. Plummer; 1927: E. G. Cowen, M. D. James, G. E. Thomas; 1928: A. E. Beitzell, J. W. Gaffney, M. W. Keyes, G. D. Mock, W. B. Moore; 1929: N. P. Stathis, F. W. Turnbull, G. R. Williams; 1930: G. L. Arnold, J. R. Bloom, C. W. Maskell, J. A. Mathews, N. C. Nelson; 1931: J. N. Higgins, C. E. Loucks, E. S. Worden, Jr.; 1932: G. A. Lowery, F. M. Moss, R. S. Prescott; 1936: H. F. Lippitt, E. R. Pettebone; 1937: G. B. Hunter, Jr.; 1942: Sutton Monro, and Z. W. Wilchinsky. — FRANK W. MILLIKEN '04, *Secretary*, 613 North Greenwich Street, Falls Church, Va. ALBERT F. BIRD '30, *Review Secretary*, 5070 Temple Hills Road, Southeast, Washington 20, D.C.

CLASS NOTES

1888

Our very active and busy Assistant Secretary, Sanford Thompson, has opened a new office in the Park Square Building for handling management matters while still taking care of engineering matters at the old stand, 620 Newbury Street. — Our President has taken the gold medals at flower shows since "the memory of man runneth not back to the contrary." Here is the latest clipping from the Boston *Herald:* "Gold medal and cultural certificates were awarded to Edwin S. Webster of Chestnut Hill and the Gardner Museum for chrysanthemum displays." — Edward S. Gould has recently moved from Lawrence, Mass., to Fort Worth, Texas, Box 1364. Fred Ellis's new address is 26 Winthrop Street, Melrose 76, Mass.

Frank Ladd, who was mentioned in the January notes, has written us as follows: "I have to do my football on the radio now, and as we have three good teams around here, I am busy. I think the Army team was as good as any ever has been. A 250-pound fullback is bad medicine. I have three grandsons in the service. The oldest one is a captain in the Army Air Forces and has been sent to the Army Transport Service at Miami, Fla., preparatory to being assigned to some permanent position somewhere in the world. My namesake has just gotten his wings at Harlingen, Texas, and is now at Fresno, Calif., finishing his training as a bombardier. The third grandson is at Clinton, Miss., taking a Navy V-12 course. This is the old university of Mississippi, hotbed of secession and center of the old plantation south. I never met Mr. Very, Secretary of the Class of '87, but have re-

called some incidents that impressed him. There are plenty of things to worry about, but let the present generation solve them. I hope the war will end before the world is ruined."

Walter M. Saunders, analytical and consulting chemist of Providence, R.I., who was with us only in our freshman year, died on September 22. He was born at Johnston, R.I., in 1866 and also attended Brown University. For seven years he was instructor in chemistry at Brown and in 1896 began his practice as analytical and consulting chemist. For most of his life Mr. Saunders was actively associated with the New England foundry industry as a consultant and was a frequent speaker at meetings of the New England Foundrymen's Association, of which he was a veteran member. — Albert J. Perkins of 394 North Main Street, Santa Ana, Calif., likewise with us during our freshman year, passed away on November 20. He was an orange grower and was never able to come east to any of our class reunions. — BERTRAND R. T. COLLINS, *Secretary*, 39 Wiggins Street, Princeton, N.J. SANFORD E. THOMPSON, *Assistant Secretary*, The Thompson and Lichtner Company, Inc., 620 Newbury Street, Boston 15, Mass.

1890

Coming across the country, the Secretary stopped in at the Chicago offices of Benton Sturges and Charles Fitts. Unfortunately neither was in on that afternoon. Sturges lives at Geneva Lake, Wis., and according to his secretary has retired and rarely comes to his office, which is at 105 West Monro Street. He was reported as being in fairly good health. Charles Fitts, with Rodger Ballast Car Company, 80 East Jackson Boulevard, is still active and comes to his office every morning.

Fellows: We are shy one man on our Alumni Fund quota for this year. Won't a couple of you chip in and carry us over the top? The number of contributors expected from our Class is 31, and up to the time of writing only 30 had contributed. Our amount contributed, however, was 64 per cent to the good, the quota being $620 and the receipts $1,020.

Charlie Locke sends a letter asking how the Class proposes to celebrate its 55th this year and mentioning that the Alumni Banquet will be held on Saturday, June 23. At the last banquet, the classmates present agreed almost unanimously that, with existing travel conditions, hardly any of us could be expected to make an overnight journey, and that the celebrants would probably be limited to those living near by. A room at the Statler for class headquarters on Alumni Day may be all that is practicable. The Secretaries would like to have suggestions. Drop us a line. — GEORGE A. PACKARD, *Secretary*, 50 Congress Street, Boston 9, Mass. HARRY M. GOODWIN, *Assistant Secretary*, Room 4-242, M.I.T., Cambridge 39, Mass.

1892

We have the following note for The Review from Ralph Sweetser: "Please change my mailing address from 7 Mitchell Place, New York 17, N.Y., to care of McCrossin Engineering Company, Rusk, Texas, where I soon go as consultant engineer in the design and construction of the charcoal blast furnace and chemical plant being built by McCrossin Engineering Company as agent for Defense Plant Corporation; F. H. McGraw and Company are construction engineers; and Chemical Construction Corporation, architectural engineers." Classmates may recall that Sweetser has been doing a very efficient job as our class agent on the Alumni Fund.

Harry J. Carlson reports that at the request of President Compton he represented the Institute at the inauguration of Charles Franklin Phillips as president of Bates College. Carlson is a trustee of Bates College. — I have received a letter from John Hall, who served us so faithfully and efficiently as Secretary for 20 years. Hall has nothing personal to report except his interest in the reorganization of the Boston City Club, where in the past we have held a number of class dinners. — Harry A. Burnham was called back, after retirement, into active duty on his former job as engineer with the Factory Mutual Fire Insurance Company. He is well and going strong.

The following note has been sent in regarding Fred Maynard: "A veteran coffee executive, Fred B. Maynard of the Martin L. Hall Company, Boston, was honored . . . by his business associates and friends with a luncheon at the Parker House, celebrating his 75th birthday. The gathering enjoyed a talk by Bill Cunningham, *Herald* columnist, who paid tribute to Mr. Maynard's contributions to the development of the coffee business, to which he has devoted the 55 years of his business life."

We extend to Spencer Hutchinson our deepest sympathy in the loss of Mrs. Hutchinson, who died in November, and our sincere hopes that he himself may be restored to full health after an attack of pneumonia a short time before Mrs. Hutchinson's death. — CHARLES E. FULLER, *Secretary*, Box 144, Wellesley 81, Mass.

1894

For the second time in 1944, members of our Class have participated in the Class Day exercises of a senior class which has finished its undergraduate career. It will be recalled that Alan Claflin, with a charming combination of wit and seriousness, spoke for the 50-year Class at the exercises held in February. At the October Class Day exercises our distinguished legal light, William H. King of New York, gave the message from our Class. King recalled some of the events, both amusing and serious, which occurred in our own undergraduate days and paid high tribute to professors of those days of long ago and to some of the classmates who have gone to the front rank in their respective professions and callings. To mention examples of successful careers and the association therewith of the pleasant but also hard-working life of the students of 50 years ago helps to give the new graduates a view and perspective that are useful as well as historical. They learn that the Institute has ever been a place for hard and honest work, and perhaps are impressed also by the increase in the facilities for enjoyment and social life and student welfare that have come with the years. King's brief address as our representative was admirable in all respects, with sly humor lighting his remarks, which in the main were expressive of the deep gratitude and honor we all feel for our alma mater.

The painting of the portrait of the Secretary, which was mentioned with sincere appreciation in our notes in the December issue, has now been completed, and ere long the finished work will be turned over to the Institute. In company with several other portraits by the same artist, H. Bingham Ballou, Jr., it was on display in December during one of the exhibits by modern artists held in the gallery room at Symphony Hall, where numerous comments on the fine posing, the excellent likeness, and the fine technique of the artist were overheard. The Secretary feels sure that all his classmates who may ever gaze upon it will recognize it as a first-rate presentment of the subject in the serious pose that an emeritus professor and dean should present to posterity.

A hasty business trip to Rochester to see some special equipment at the Eastman Kodak works had as its high point a most enjoyable luncheon with Frank Lovejoy and his wife. It is a great satisfaction to be able to report that after an illness of five months, much of which was spent in the hospital, Frank is again on the highroad to better health and is able to give a limited amount of time to business at his office. His wife has watched and guarded him with devoted care, and we are grateful to her for so effectively preventing Frank from overwork on the one hand and boredom on the other. Having made all plans for coming, they, as well as all the Class, were greatly disappointed that they could not be with us at Swampscott in June.

It is with great regret that we report the death of Theodore Varney, which occurred at his home, 33 Liberty Street, Nantucket, on October 2. Varney entered the Institute from Watertown and pursued the course in Electrical Engineering. His first positions were in Indianapolis. Later he became electrical inspector of the National Board of Fire Underwriters, Chicago. In 1902 he went to Pittsburgh to join the engineering force of the Westinghouse Electric and Manufacturing Company, where he remained for several years. For the last 20 years or so he was connected with the Aluminum Company of America in Pittsburgh, at their Canadian branch, and in the New York offices. He was an expert on the subject of power transmission. For several years past he had made his summer home in Nantucket, and here he took up permanent residence after his retirement from active professional work. A quiet, rather reserved but friendly man, Varney had not in recent years been much in contact with the Class, but he will be remembered with sorrow by his old associates in Course VI, and the Class in general will deplore his passing.

George W. Harring, who also was a member of our Class in the first two years and a student in Electrical Engineering, died at his home, 459 Poplar Street, Roslindale, on December 7. Almost throughout his whole career Harring had been connected with the Boston Elevated Company and its predecessor, the West End Street Railway Company. His interest in Class affairs was never highly developed, but we nevertheless regret to add one more name to the growing majority of those once our companions but now passed beyond our ken. — SAMUEL C. PRESCOTT, *Secretary*, Room 3-233, M.I.T., Cambridge 39, Mass.

1895

Albert Geiger, of Boston and Duxbury, Mass., passed away on December 6, at Faulkner Hospital. He was with our Class during 1891–1892 in Architecture. His business covered real-estate brokerage, but he devoted considerable attention to erecting special buildings under leases, principally to automobile dealers. He was a member of the Algonquin Club, The Country Club in Brookline, and the Boston Yacht Club. A great enthusiast in athletics, he had been at one time chairman of the Boston Athletic Association and was a member of the American Olympic Committee at the games in Berlin and Paris. During the Boston police strike, Al was a member of the guard who patrolled the streets and was credited with the introduction of the painted streets for traffic direction, later adopted throughout Massachusetts. He is survived by Mrs. Geiger.

Gerard H. Matthes writes most enthusiastically about his work. He states that he was almost overwhelmed on December 9, when presented with the Exceptional Civilian Service Award from the United States Army. The presentation was made by Brigadier General Max C. Tyler, President of the Mississippi River Commission, in front of Gerard's office and attended by more than 400 of his employees. Incidentally, his pay roll numbers about 500 civilians and some 1,300 prisoners of war. General Tyler stated: "At the beginning of the war, when the Waterways Experiment Station became an important cog in the engineering activities of our combat forces, direction of the many and multitudinous studies at the Station was placed in the hands of Mr. Gerard H. Matthes. After some 10 years at the Mississippi River Commission, during which he had led the planning of the cutoff program on the lower Mississippi River, it was felt that Mr. Matthes had a wealth of ability and experience to handle the military, flood control, navigation, and other problems sent here for solution.

"We are here today because Mr. Matthes has done a good job at the Mississippi River Commission and because he has done another good job here at the Station. Not only has his performance been outstanding, but his zeal and interest have been such that he has cheerfully relinquished his right to retire for age and has stayed here on the job. It is with great pleasure, acting at the direction of the Secretary of War, that I read the following citation: For his outstanding service and exceptional engineering ability in planning and executing the Channel Improvement Program on the lower Mississippi River and in directing the operations of the U.S. Waterways Experiment Station. His accomplishments in the Corps of Engineers have resulted in eliminating costly floodways, opening thousands of acres of profitable land for agriculture, and solving many important problems for the Navy Department relating to breakwaters and harbors." This is the second honor bestowed on Matthes during the year 1944. The first was in January when he received the award of honorary membership in the American Society of Civil Engineers.

Matthes gives us the following short description of the reservoir operation model of the Mississippi River and tributaries: "The Reservoir Operation Model is being constructed at a cost of approximately $3,000,000 as a unit of the U.S. Waterways Experiment Station and when completed in the postwar period will be the largest hydraulic model ever built in the world. It was initiated by order of the chief of engineers and is being built under the supervision of the president of the Mississippi River Commission, Vicksburg, Miss.

"All the main streams within the 1,244,000 square miles of the watershed of the Mississippi River will be represented on the model, and its area will include all or part of 28 states, or 41 per cent of the total area of the United States. Besides the Mississippi River, the Ohio, Tennessee, Missouri Arkansas, and Red rivers will be built in the model along with their principal tributaries. These river systems are over 15,000 miles in length. The model will be built to a scale of 1 foot representing 2,000 feet horizontally and 1 foot representing 100 feet vertically. This scale requires the use of 200 acres for the model, measuring 4,500 feet in an east-west direction and 3,500 feet in a north-south direction, and a vertical range in elevation of the ground surface of 50 feet. The total length of the model streams will be nearly 8 miles. All existing and proposed flood control reservoirs totaling about 200, as well as levees, dikes, flood walls, floodways and other pertinent works will be reproduced. The lower Mississippi River, which has a width of about 4,000 feet and a bankfull depth ranging from 50 to 150 feet, will be scaled down in the model to a width of 24 inches and a depth of from 6 to 18 inches.

"Using data obtained in nature, floods of known magnitude will be placed in the model and their courses recorded by sensitive electrical recording devices, expected to number about 1,700. Water for the model stream will be controlled by mechanical measuring equipment, electrically operated from central control points. More than 1,000 gallons of water per minute will be required to operate the model since the amount will represent at the scale of the model a maximum flood of record in the lower Mississippi River. The model rivers will be molded in concrete with the intervening ridges and valleys covered with sod.

"The purpose of the model is to provide a visual means of studying the many problems which arise in the operation of so large a number of reservoirs as those already built or those contemplated. These reservoirs will aggregate a billion and a half dollars in cost when all are completed. At the present time only grading and drainage work is being carried on, using about 1,300 German prisoners of war for labor, working with wheelbarrows and shovels, or operating trucks and tractors. Prisoners of war have already cleared the site and constructed temporary roads, bridges, and drainage ditches. The actual model construction will be postponed until after the war when needed materials become available. Upon completion a road around the model, three miles long, and viewing towers will be provided to enable visitors to observe the model in operation. The U.S. Waterways Experiment Station, which is headed by Gerard H. Matthes, head engineer, has long been recognized in technical circles as one of the world's leading hydraulic laboratories. Officer in charge of construction is Captain H. G. Dewey, Jr., Corps of Engineers, U.S. Army."

Don't fail to come to the 50th reunion of the Class next June, if you are able. — LUTHER K. YODER, *Secretary*, 69 Pleasant Street, Ayer, Mass.

1896

Through the new Dean of Architecture at Technology, Professor W. W. Wurster, information has come to the Secretary regarding Charles Gilman Hyde. It seems that on June 30 Charlie Hyde reached the age of retirement from the sanitary engineering course which he had carried on for nearly 40 years at the University of California, and observance of this event took place on July 8, at the Claremont Hotel in Berkeley, Calif., under the auspices of the sanitary engineering alumni of the university. A stag party of 50, composed of Professor Hyde's alumni back to 1907 together with many of his sanitary engineering friends and associates through the years, comprised the attendance. Many letters of greetings and congratulations were read, from people who were unable to attend in person. In addition, several of the alumni who were present paid vocal tribute to Charlie's fine qualities as a teacher and his splendid professional record. In the course of the evening a presentation was made of a framed scroll containing the names of Charlie's sanitary engineering students by classes over the 39 years of his teaching service at the university. Finally, Charlie himself got on his feet and gave a most feeling response to the tributes which had been paid him, and the dinner ended with the singing of "For He's a Jolly Good Fellow." Parenthetically, the Secretary might add that Charlie's modesty apparently prevented him from sending on any report of this important event and the Secretary would never have learned of it had it not been for Dean Wurster.

Another dinner for classmates in Washington was pulled off on December 6 with Marsh Leighton as the host. The following account is submitted by Colonel Billy Haseltine: "Leighton and I met for luncheon at the Army and Navy Club yesterday noon to select the menu, since we cannot specify in advance of the day of the dinner, but must take what the club proposes to serve on that particular date. This time we were fortunate enough to have roast beef, which is served only once in about 10 days for reasons which you can well understand. Leighton made the selection, as it was his dinner, and he gave us oysters, pea soup, the roast beef above mentioned, baked potatoes, beets, pumpkin pie and, of course, coffee, which, as you can see was quite a feast for these rationing days. In ordinary times we should not think of mentioning the menu, but nowadays it is one of the chief topics of conversation. Six were present — Marshall Leighton, Bradley Stoughton, Joe Clary, Harry Hamlet, George Stratton, and myself. We had expected seven, as McAlpine had written that he would be there, but at the last minute he did not show up. Of course we had a fine time and visit, and really begin to feel reacquainted after so many years, and have many things to talk about regarding the old days, not to mention a fund of good up-to-date stories."

Ralph Henry returned from his home in New Hampshire and became located for the winter at 247 Fisher Avenue in the town of Brookline, Mass. Russell T. Starr has moved to a new residence at 47 Plaza Street, Brooklyn 17, N.Y. Starr was formerly in the lumber business in Brooklyn, but has been retired for some years.

Charlie and Bertha Tucker came to town on December 1. He has disposed of his dairy herd, and the man who has purchased milk of him for many years now sells milk to Charlie. They had a very busy time during the apple-picking season. The labor problem was solved for them through the Union Jack Club in Boston, where they were able to get British sailors from ships that were laid up in Boston for repair. These sailors came two at a time to spend a week or 10 days, with the exception that on one weekend there were four of them staying with the Tuckers. Altogether 22 men were employed during the fall, and 16 of them worked on the apples. Charlie's crop amounted to 3,000 bushels this year, and he speaks in the highest terms of the fine service rendered by these British boys. Without them his apples would have rotted, because there was no local help available.

The third in the series of stories by Bob Flood follows and features our classmate, Ralph Whiting: "When Sigma Tau of DKE rented the big house in Massachusetts Square, every fellow furnished his own room. There was a U-shaped table in the dining room, a knife and fork, spoon, cup and saucer, glass, and plate all round. Any fellow breaking anything had to replace it with two of the kind. In 30 days we had more equipment than we knew what to do with. For the living room we found a discarded carpet under the cellar stairs. Dragged it out, hung it up, and beat it. After 10 days the call went out: 'Everybody show up.' We lugged in the carpet, laid it down, lighted the gas jets, and pulled the shades. In no time the room was insufferably hot and dusty. 'Open the window,' someone yelled, and Whiting, being nearest, stepped up on the low window sill, reached around the shade, and raised. He set off the shade, and it rolled to the top with a bang. Now it happened that five young ladies, all well known to the chapter, were passing. They heard the pistol-like report and looked up. And there was Whiting, the personification of Mercury, in striped shorts and oxfords, reaching. Shrieks went up from the sidewalk, howls from the room. Whiting was a strapping big fellow and athletic. He got the shade, turned, and scowled. The laughter in the room died. There is a full account in the archives of the fraternity, or was. After graduation Whiting became the secretary and manager of the Red Cedar Shingle Bureau in the Northwest. One time in a lumber camp, snowbound, there was a stranger. The stranger did not show up for meals. When he did, Whiting spoke to him: 'Haven't seen you around for several days. Been sick?' 'No, just had some work to do and was anxious to get it over with.' 'What kind of work?' 'Writing a story.' 'Well,' said Whiting sympathetically, 'now I suppose your hard work begins — thrashing it into shape.' 'Lord, no, all I'm interested in is getting it down on paper and off to the publishers. Let them do the rest.' 'That's interesting,' smiled Whiting. 'My name's Ralph Whiting, and yours?' 'Peter B. Kyne.' " — CHARLES E LOCKE, *Secretary*, Room 8–109, M.I.T., Cambridge 39, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge 38, Mass.

1899

Earle B. Phelps, V, has been professor of sanitary science in the College of Physicians and Surgeons at Columbia University since 1924. He retired on December 31, 1943, with the title of professor emeritus, but proved to be another indispensable man and was recalled to active duty.

Prior to his connection with Columbia, Earle was at the hygienic laboratories of the United States Public Health Service in Washington. He retained his connection with the health service by continuing his active association with the stream pollution studies at the Cincinnati laboratory, with the title of consultant. He also has been consultant in his line with the New York state and city departments of health. The latter position is still active. For many years he served as special expert to the Metropolitan District Water Supply Commission of Massachusetts dealing with the Ware and Swift rivers' diversions and resultant claims for damages. He also has had a good deal of minor consulting practice in the field of sanitary science.

Last winter Earle spent three months at the school of tropical medicine, University of Puerto Rico, San Juan, as visiting professor. He will return there this winter and also has been appointed research professor at the University of Florida, where he will spend the remainder of the winter. He has published two books, *Principles of Public Health Engineering*, 1925 (now being revised), and *Stream Sanitation*, 1944.

Earle has a wife, two sons, three daughters, and eight grandchildren. He spends his summers at South Harwich on Cape Cod, and it looks as though he will continue to migrate with the birds to Florida for the winters. A happy prospect! Eh, what? — BURT R. RICKARDS, *Secretary*, 381 State Street, Albany, N.Y. ARTHUR H. BROWN, *Assistant Secretary*, 53 State Street, Boston 9, Mass.

1905

A very enjoyable and successful reunion of the Boston gang took place at the Statler Hotel on December 11 with 18 members present. After partaking of the hotel's best war dinner, considerable discussion took place as to a 40th reunion in June. It was the unanimous opinion that such a reunion should be planned on a Victory model basis and the Secretary was authorized to appoint a committee to canvass class members to ascertain their pleasure as to time and place. Having learned that Jim Barlow, I, was convalescing from an operation at the Maine General Hospital, Portland, Maine, we called him up by telephone and each member of the Class present was able to say "cheerio" to Jim, who sounded as though he were convalescing satisfactorily. Present at the meeting were Cowdrey, Goldthwait, Hinkley, Kenway, McLean, Pirie, Prescott, and Stevenson, all of Course II, also Shapira, III, Donald, III, Ball, III, Morrill, V, Barrier, V, Young, V, Killion, I, Tufts, I, Wentworth, VIII, and Tower, XIII. It seemed like old times, singing the old songs with Pirie and Killion at the piano.

A surprise announcement comes from Gene Kriegsman, namely, that of his marriage on December 3 to Mrs. Caroline Simonsen Said at the Hamilton Hotel, Washington, D.C. Gene says he relinquishes his title of class bachelor to Henry Buff, with the hope that he too may see the error of his ways and in turn relinquish it. Claims to the title made in due form will be received by the Secretary and fairly and impartially considered. With an entire change of subject, we announce the return to his old stamping grounds of Percy Goodale, VI, who had been tempted to the glamour of the New York insurance field for the past few years. Percy, with his retinue of several hundred, is inhabiting half the ground floor at 40 Broad Street, Boston, representing, as usual, Preferred Accident Insurance Company.

We have to report the deaths of two members, Joseph C. Baker, II, who died at Syracuse, N.Y. on May 10, and Bertram N. White, I, who passed on at Machias, Maine, on April 12, 1941. — FRED W. GOLDTHWAIT, *Secretary*, 274 Franklin Street, Boston 10, Mass. SIDNEY T. STRICKLAND, *Assistant Secretary*, 71 Newbury Street, Boston 16, Mass.

1906

Otto B. Blackwell, VI, formerly vice-president of Bell Telephone Laboratories, has been appointed assistant vice-president of American Telephone and Telegraph on the staff of the vice-president, Keith S. McHugh. Blackwell has also been elected to serve on the laboratories' board of directors. His service with the Bell system dates back to 1906, when he joined the engineering department of the American company following his graduation. He became transmission and protection engineer in 1914, and with the formation of the department of development and research in 1919 he was made transmission development engineer. When that department was consolidated with Bell Laboratories in 1934, Blackwell was appointed director of transmission development; the following year he became manager of staff departments. From December, 1936, to last October 1, he was vice-president. Readers who perused the 1909 class notes in The Review for December may already have learned of Otto's new job, as Reg Jones of that class succeeded him at the Laboratories and it is so noted in the 1909 notes.

Thanks to Percy Tillson, who submitted a clipping from the Harrisburg *Telegraph* of October 9, we are able to record an item about another classmate, P. A. Staples, I. "M. S. Hershey, 87, chairman of the board of the Hershey Chocolate Corporation, has resigned as head of three of his other corporations, the Hershey Industrial School, the Hershey Trust Company, and the Hershey Foundation, the Hershey Estates announced yesterday. He will be succeeded by P. A. Staples, who has been associated with him in the Hershey Corporation, the Cuban sugar enterprise, for almost a quarter of a century. Hershey said yesterday: 'I am in good health, but I can't expect to live to be a hundred years old. Besides, I do not want any disorganization when I pass away. I have selected a good man to carry

on . . . I am planning, during the remainder of my life, to be of help to him and his associates. . . .' Staples, 61, was born in Portland, Maine, and educated in the public schools and the Protestant Episcopal Academy in Philadelphia. He received the Bachelor of Science degree from Technology. His early work was with the U. S. Coast and Geodetic Survey in Washington, the Philippines and Canada. Later he was associated with M. G. White and Company, of New York, the Stone and Webster Company, Boston, several public service companies operated by W. S. Barstow and Company, of New York. He was also in partnership with English chemical interests with offices in New York. The Hershey Industrial School, for the education and care of orphan boys, was founded in 1909 and endowed with stock of the Hershey Chocolate Corporation, the Hershey Corporation and other interests now amounting to $84,000,000. The officers and directors of the Hershey Trust Company control these funds. The Hershey Foundation is concerned with public school education in Derry township, which supports the Hershey Junior College." In the letter which accompanied this clipping, Percy said he might get in touch with the Secretary as he was coming to Boston to his son's graduation from Technology. His son was a Navy V-12 student enrolled in Course V. On Saturday, October 28, the Secretary had the pleasure of a telephone conversation with Percy. Young Tillson is now attending the Midshipmen's School at Columbia University.

Assistant Secretary Ned Rowe, who is also our class representative in the Alumni Council, contributes the item that Malcolm Wight is now the Council representative for the Hartford Club and has attended two of the Council meetings in Boston. Malcolm is with the Hartford Fire Insurance Company in that city and is prominent in affairs of the New England Council, an organization for the promotion of New England's commercial welfare.

In spite of world conditions, the writer personally felt a little more like celebrating Christmas this year as his son, James N. Kidder, who had been in England for over a year with the Eighth Air Force, was then on his 21-day furlough and was present at the family Christmas party. He had successfully completed 30 missions in a heavy bomber. After hearing of his experiences, the family could not be too thankful for having him back during the holiday season. — James W. Kidder, *Secretary*, Room 801, 50 Oliver Street, Boston 10, Mass. Edward B. Rowe, *Assistant Secretary*, 11 Cushing Road, Wellesley Hills 82, Mass.

1909

Henry Spencer, II, sent in a clipping from the Boston *Herald* of October 29 showing the picture of a young lady with the following caption: "Miss Marion G. Cornell, daughter of Mr. and Mrs. Harold C. Cornell of Dedham, who announce her engagement to Lt. Albert E. Thornley, Jr. USAAF, son of Mr. and Mrs. Albert E. Thornley of Pawtucket, R.I. Lt. Thornley is stationed in Denver, Col." Asked for further particulars, Albert, Sr., replied: "As far as amplification is concerned, they seem to be rather fussy about giving out any information concerning the school where my son is, but I think it would be all right to say that he is at Lowry Field, Denver, Colo. Just why they are so particular at this stage of the game, I don't know, but they have impressed pretty much on the boys that they don't want too much information given out as to just who is there, or what they are doing. . . . As for the tennis rackets, I was interested in what you had to say, and regret to advise that we are no longer in the tennis racket business, so you had better make that one last as long as you can! I am glad they have been satisfactory." (See also The Review for June.)

We have received the following from George Wallis, our Assistant Secretary in Chicago: "Last Friday evening I attended a dinner meeting of the local Technology Club, and two other classmates were present. Louis Jacoby, VI, showed up for the first time in many a session. Since 1928 he has been the Chicago representative of the Chase National Bank and previously was associated with the Westinghouse Electric Company for 20 years. Harvey Pardee, who regularly attends the Technology meetings, advises that his research laboratory is very active and working on some most interesting developments. Harvey has two daughters and three grandchildren. One daughter is in the Army intelligence service in Washington, and the other is now residing with him at Highland Park, Ill. while her husband is in the service."

Here are two more honors for men of our Class. In the notes for November it was reported that Brad Dewey had been awarded the Chemical Industry Medal. Now comes the announcement that the American Chemical Society has elected Brad as their president for 1946. Johnny Willard, not to be outdone, early in December was elected president of the Association of Consulting Management Engineers, Inc., at its annual meeting at the University Club in New York. The Secretaries, on behalf of the Class, have congratulated both Brad and Johnny.

Mrs. Jeanne Scharff, on receiving birthday congratulations from the Secretary, replied in part as follows: "My birthday was made particularly happy by a cable from Samuel, followed a day or two later by a very cute, amusing letter. He's having quite a time but I miss him just the same. His unit got a presidential citation for their share in the Bismarck Sea Battle, and he won't wear it because he wasn't up front! He had a grand bit of luck in being sent down to Melbourne on special assignment — luck because Sidney and Melbourne had been declared out of bounds to the men. Then, when he got a week's leave, he went to the Red Cross recreation area at Coolangatta on the coast and had a grand time there. He said it was a very picturesque shore line but he didn't swim because of sharks and he did see a school of whales! Also, that the Red Cross did very well by the men as the steaks were lovely, lovely, and the roast beef, delicious! He has been packed and ready to go north for at least two weeks; so that now with the Philippine invasion on, I'm sure he has left Australia. Ah me! It can't be over too soon to suit me. I'm so glad you get good news from your nephew. There is no special news about Molly. He's still doing the same work and is busy and well."

The Class will be pleased to learn that, although the Democratic Donkey rampaged over most of the pasture last November 7, Tom Desmond was re-elected as New York State Senator on the Republican ticket with the largest plurality ever received by a candidate from that district. Since entering the State Senate in 1930, Tom has been re-elected seven times, each time with an increasing plurality. The Class congratulates Tom most heartily not only on his re-election as state senator but also on the success with which he conducts that high office.

Here is also news from Charlie Johnson, IV, sent in a letter to Tom: "By mail I am sending you a copy of *The Pearl of Orr's Island* by Harriet Beecher Stowe. A picture of the 'Pearl House' is on the jacket. My sister bought this house four years ago, and she now makes it her home. The book has been out of print for many years, but she persuaded the publishers to get out a new edition. The chances are that neither you nor Mrs. Desmond has read this book, and I think that you will find it very interesting. It isn't read much outside of Maine but is a very popular book in this state. Before the war a book dealer in Portland told me that he had to advertise every year for copies to meet the demand from tourists.

"I was at West Point for two months this spring and came here to spend a vacation with my sister. After a few days I visited the Air Station in Brunswick, which is 12 miles from Orr's Island, and they were in need of an architect; my vacation was thus cut short. For the first time in 30 years I'm back on the boards again. When I was with Cass Gilbert, I had an executive job and didn't do any drafting, but I haven't had any difficulty with the work. There are several young Tech men here with me. The work is very interesting, and I'm learning something about air fields. We have charge of all the construction at four other fields in Maine besides some outlying facilities. There are a lot of pilots from the Royal Navy who are here learning to fly the Corsairs. A short while ago two of them collided in formation over the field, and both crashed near our building. The other day two squadrons lined up at the end of one of the runways and took off at 10-second intervals. It was an interesting sight.

"My son returned in July after almost four years in Panama. After a visit here with me he went to Atlantic City and was assigned to the Sedalia Army Air Field in Missouri. Recently he has been at Wright Field taking a course on a new radio transmitter. I didn't relish driving to Orr's Island this winter; so about two months ago I got an apartment in Brunswick near Bowdoin College. These apartments are restricted to officers and civilians at the station. I was lucky to be able to get one as there is a long waiting list. As the Navy runs a bus from the apartments to the job, I can put my car up this winter. I've been away from the library for more than two years, but it seems to be going along all right. They made me a trustee, but I felt that they ought to put someone in my place who was in the town all the time. I submitted my resignation, but they wouldn't accept it."

Tom replied in part as follows: "There was quite a coincidence attached to the

receipt of your letter. On the very day that it came I had dictated a letter to you, addressed in care of the Putnam Valley Free Library, of which you are a trustee, telling you that I was sending the library a copy of the new book by Mrs. Desmond which the Macmillan Company published this week. This is my wife's ninth book, called *The Sea Cats*. It is a book for children which tells the adventures of an Aleutian boy in the Pribilof Islands of Alaska, with an educational background which gives much information for younger readers in regard to the fur seal industry. Today I forwarded the book to the Putnam Valley Free Library to be added to the others by Mrs. Desmond which we had previously presented to that library because of your interest in it."

The Review Secretary takes unusual interest in the Brunswick locale since it is en route to his summer residence near Boothbay Harbor, only a few miles beyond. Interest in *The Pearl of Orr's Island* has undoubtedly been greatly stimulated by the current play *Harriet*, in which the book is mentioned. — PAUL M. WISWALL, *Secretary*, 90 Hillside Avenue, Glen Ridge, N.J. CHESTER L. DAWES, *Review Secretary*, Pierce Hall, Harvard University, Cambridge 38, Mass. *Assistant Secretaries:* MAURICE R. SCHARFF, 3860 Rodman Street, Northwest, Washington 16, D.C.; GEORGE E. WALLIS, 1606 Hinman Avenue, Evanston, Ill.

1910

Frank Bell has again written of his activities as colonel of a construction regiment in France. The following letter was received early in December: "Things move fast here. We were relieved from the situation described in my last letter when the place surrendered, and for the last two months we have been opening up a place about 350 miles away. We came in while it was a shambles, with fires burning and sniping still going on. We had literally to bulldoze ourselves through the town. With the help of captured German demolitions we cleared up pillboxes, barricades, and so on, and now have a truly going city. Of the former population of approximately 200,000, only 40,000 remained at the time we came in. Even so, it was tough going. We have made good use of captured German dill pickles and German canned potatoes, labeled on the can, 'Made in England.' As project engineer I have been very busy. The worst work has been the deactivation and disposal of mines, booby traps, and unexploded demolitions, the last of which come in handy. The place was heavily mined, and this part of the work always falls to my regiment. It is very tough to have to write those letters to homes where nothing one can say will help."

Recently I met Allen Curtis on his daily walk to the North Station. Allen is in fine condition. His son is a captain in the Marine Corps in the South Pacific. I have also run across Otto Rietschlin, now with the Morton C. Tuttle Company of Boston. John Wentworth, who has been working with me on the renegotiation of construction contracts for the price adjustment section, has resigned and will return to his firm of Metcalf and Eddy, sanitary engineers. — HERBERT S. CLEVERDON, *Secretary*, 117 Grant Avenue, Newton Center 59, Mass.

1911

Hats off to Luis deFlorez, II, a captain in the Naval Reserve, who, at a ceremony at the United States Chamber of Commerce on December 17, the 41st anniversary of the Wright Brothers' first flight at Kitty Hawk, was awarded the Robert J. Collier Trophy for 1943 "for his contribution to the safe and rapid training of combat pilots and crews through the development of synthetic devices"! This trophy is awarded annually by the National Aeronautic Association for the greatest achievement in aviation in America, the value of which has been demonstrated by actual use during the preceding year. We are all justly proud of you, Monk!

Through the characteristic thoughtfulness of Ottilie Cushman, wife of Paul Cushman, VI, I recently received a clipping from the Cleveland *Plain Dealer* recording the presentation of the Ordnance distinguished award to the American Society for Metals, with a picture of our own Marc Grossmann, III, retiring President of the society, receiving it along with the Secretary, W. H. Eisenman. If *you* think *you* still look young, you should see how Marc has retained his aurora borealis facial expression. How do you do it, busy as you are, Marc?

In late November a fine letter came from Harold L. Robinson, I, a major, still on active duty at Pocatello Army Air Base at Pocatello, Idaho. Robbie says, in part: "Things are about the same out here. I am one of the original settlers at this station, having been here since the place started. As director of maintenance and supply I have charge of all maintenance, including airplanes, vehicles, machinery, and buildings, as well as supplies of all kinds. My son, Henry, is with the Fourth Army Headquarters at Fort Sam Houston after getting through the Staff and Command School in August. I don't know whether he will go across again or not. One purple heart is enough in this war. My second boy, Richard, is doing research work on cathode tubes with a New Jersey firm and was rejected by the Navy as they considered his work more important than active duty.

I sure will be glad to see good old New England again. I tried to get a discharge, but my efficiency rating is too high and the Air Forces would not let me go. I am still hoping I can get one when the European situation is over, because I want to start my business up and am looking forward to resuming regular attendance at the meetings of the Worcester County Alumni Association."

Another major — Ted Van Tassel, X — writes of a fine visit he and his wife recently had with Bill Warner, I, and his wife. Ted, you know, is stationed at the Reconditioning Annex, Station Hospital, Camp Gruber, Okla. Let Ted tell it: "Helen and I drove over to Nowata, Okla., Sunday, November 12, and called on Bill Warner and his charming wife. It was a pleasure to see Bill again; he has not changed a bit since reunion. He and his wife have a very comfortable home with some unusual antiques and a very interestingly landscaped yard. The item of particular interest is a most unusual sundial, completely different from the ordinary stationary type. Bill's is rotatable, compensating for the season of the year, and probably telling not only the hour but also the minute — maybe the second. It's really something! We drove out to his livestock ranch, about 18 miles from town, really out in the sticks, past prairie, oil pumps, and frontier scenery. Bill has quite a herd of black Aberdeen Angus cattle, the patriarch being a bull for which Bill paid $3,000 — a beautiful beast and gentle as a kitten. We saw several of his progeny, proving that Bill made a good investment. Bill also has some nice horses and a couple of tractors, including the latest Ford-Ferguson with all the modern gadgets, which Bill can operate like a virtuoso. Nowata is a progressive city which reflects the benefit of having Bill serve for four terms as mayor. One of Bill's Nowata friends had run across George Kenney in the southwest Pacific and had a lengthy conversation, which he reported to Bill and Bill appreciated no end." Ted, by the way, reminded me that when they assigned him to his present type of work (reconditioning) he was transferred from Chemical Warfare to the Medical Administrative Corps. Hold it! A card has come from Texarkana on which Ted says: "I tried to locate Dutch Van Hovenberg, XI, here — but no luck. Am en route to new post: Regional Hospital, Camp Polk, La." He sho' is the travelinest man!

We had a fine letter from Don Stevens, II, in mid-December, in which he enclosed a fine check payable to the Institute, doubling his 1944–1945 contribution to the Alumni Fund — and how that helps boost our average contribution, in which 1912 has been leading us! "As for news," Don writes, "I suppose the biggest thing in every family is the item about the boys who are overseas. My son, Read (Donald R. Stevens, Jr., '43, a lieutenant, junior grade), is now a radar officer and for the first time in the war seems to be really happy. He was on Tarawa for about eight months and got his share of the bombing, but grew very bored with inactivity towards the end. He argued his way back to Hawaii where he became still more bored with restful life and somehow or other argued his way into his present berth aboard what he considers the only ship in the fleet.

"Our three Okonite plants — Passaic, Paterson and Wilkes-Barre — have now all been awarded the Army-Navy 'E' and in each case your good friend, Admiral Wat T. Cluverius, President of Worcester Tech, did us the honors. We got to feeling that he was really one of the family. Our plants have been producing original work and have been furnishing cables which are written up in the *Saturday Evening Post* and other periodicals, where, however, no mention is made of the detail and therefore the cable remains a mystery to the public. A story on knocking out the German 'devil fish,' in a recent edition of the *Post*, is built around the electrical equipment that we make for exploding German magnetic mines. The Signal Corps carries our communication cable, known as assault wire, into the front lines of battle. The submarine mine base people take their electrical cable for anchored mines from us. I doubt whether there is a ship in the fleet that does not have a considerable amount of Okonite cable on board for gun-firing, power, communication, or a hundred and one other things. We make our share of the electrical

degaussing belts, which are laid around merchant ships to repel floating mines; radar collapsible and pulse cable; searchlight and antiaircraft cables, and it seems like a hundred others, have all been developed during the war. I don't mean to say that we are the only cable plant doing all these things, because all the cable works have been pressed into service. In some instances, however, we have been one of two, or one of three, or one of four, sources of development and supply. One thing that I am very proud of is that our employees have never joined the ranks of those who left their work. Our employees have always supported the boys at the front. In fact, we have not had labor trouble in 23 years."

Dais and Selly Seligman, III, enclosed a clipping with their holiday greetings in which a New York *Sun* columnist, Delos W. Lovelace, sketched George Kenney's background and career in a rather unique manner. "Kenney is an engineer," states Lovelace, "who got into the Army through the wide door of the first world war. When the fateful April 6th of 1917 dawned he left a railroad engineering job and joined the Air Force. He got one hour of instruction and was told to solo. He must have been either good or hard to kill, because he survived to reach the Ninety-first Aero Squadron in France and do quite a job there. Between wars he managed to reach Paris as a military attaché in time to watch the beginning of the Nazi blitz. [We heard about that at the '41 reunion.] Shortly after that we were in and he was a major-general in the Pacific. Down there he worked out excellent operation principles for parachute bombing, for aircraft artillery, for ship bombing, though his methods were pretty unorthodox. Usually he began by eying an impossible plan and saying: 'Hell! Let's try it anyway.' The general is a Massachusetts man, but born in Nova Scotia. This happened, he says, because of a slight error in timing. He is smallish, with bright eyes set deep in merry wrinkles, gray, close-cropped hair and thick, mobile lips. Not large, he never has failed to hold up his end. But this is no more than you would expect of a man descended from the English Churchills on his mother's side and from 300 years of New England bean-eaters on his father's."

Carl Ell, XI, is always good news. At Northeastern University's fall graduation there were but 37 graduates, all that remained of a record pre-war freshman class of 968. Four veterans of this war, believed to be the first in the country to complete a college education after discharge from the armed forces, were included in the class. In his charge to the graduates, Carl said: "The degree which has been conferred on you today is not so much a reward for work accomplished as it is a commission for services to be rendered." — We ran into Burleigh Cheney, II, at the New England Council's third annual war conference at the Statler in Boston this fall. He is trying to get feeder line certification in Massachusetts, Connecticut, and Rhode Island for helicopter short-haul operation by his Skyway Corporation, Providence, R.I.

This time the news which reaches us just before press time is tragic — Jack McAllen, III, died in Fairbanks, Alaska, on November 19 and was buried in Seattle, Wash., on December 12. Said the Seattle *Times:* "At the time he was stricken with a heart attack, Mr. McAllen was a member of the faculty of the University of Alaska, a position he had held for four years. He formerly was an instructor in mining and ore-dressing at the University of Washington. He also had operated the Willow Creek gold mines in Mexico and was a member of the American Institute of Mining & Metallurgical Engineers. He was born in Portland, Ore., a son of the late Dan McAllen, civic leader and promoter of the Lewis & Clark Fair. He was a graduate of M.I.T., receiving a bachelor of science degree in 1911. In the First World War he saw active service at St. Mihiel and the Meuse-Argonne, and was with the Army of occupation in Germany. He was a 32nd degree Scottish Rite Mason and a member of Al Kader Temple, Portland, Ore. Survivors besides his widow, Jane Nottingham McAllen, include two daughters, Miss Jane McAllen, Portland, Maine, and Miss Margaret McAllen, Seattle." We particularly remember Jack in undergraduate days as a fine type of rugged individualist, loyal always but steadfast in any aim or belief. Our hearts go out to his widow and daughters, and we have so written the former.

Now, before closing, hearty thanks to all those classmates who sent Christmas greetings by card or letter. They are all greatly appreciated. But listen, brother, you ain't seen nuthin' unless you have seen that "Whimsical Map of M.I.T. 1944–1945," which is this year's Christmas card from Karl T. and Margaret H. Compton. Adjectives fail — it simply must be seen; and listen to this typical Comptonesque message: "To strive to produce something which the world needs, and to maintain withal a sense of humor and of proportion, seems to us a good prescription for these grim days. In this spirit we send the season's greetings." Don't these fine letters, which have provided so much of the meat for this interesting set of class notes, make you inkless fountain-penners a little mite ashamed? Cheer up, you can overcome that shame — "Write to Dennie!" Happy Valentine's Day! — ORVILLE B. DENISON, *Secretary*, Chamber of Commerce, Gardner, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 88 Riverside Avenue, Medford 55, Mass.

1912

I was very much interested indeed to receive a copy of the Brooke Bluebonnet Broadcast telling of activities at the Brooke General Hospital, Fort Sam Houston, Texas. The bacteriological section, under Max Levine, a lieutenant colonel in the Sanitary Corps, does work on all patients who have infections of any kind. Max writes that three of his four sons are now in the service, as follows: Norman D. Levine is a captain in the Sanitary Corps in the Southwest Pacific; Captain S. Edgar Levine is a captain in the engineering corps in India; Melvin L. Levine is a first lieutenant in the Chemical Warfare Service in Italy. His son-in-law is with the Signal Corps in France. Richard C. Stickney, a colonel, has been transferred to the Headquarters Fifth Service Command, East and Hayes, Columbus 18, Ohio. R. W. Chandler, a major, has left Columbus, Ohio, and is now with the United States Army Air Forces, Headquarters Western District, 3636 Beverly Boulevard, Los Angeles 5, Calif.

Your Secretary enjoyed an extremely interesting visit with C. D. Davis, a commander in the Naval Reserve at the Naval Air Station, Quonset Point, R.I., where he rates as assembly and repair officer. Under repair comes the rebuilding of damaged planes returned from foreign service, and it is necessary to repair or reinstall everything from a gyroscope compass to a Pratt and Whitney engine, including fuselage repairs. It is certainly a busy place. — We received a very interesting letter from Bob Cox at the Cross T Ranch, Dubois, Wyo., which he operates as a dude outfit. Because of the man-power shortage, Bob is remaining at the ranch this year instead of teaching school in Tucson, as he has done for the past three winters. The Cross-eyed Observer, published by Bob for his former guests, was read with great interest.

If you have not already contributed to the Alumni Fund, won't you send a check to me or to the Alumni Office, as our showing to date is not impressive. — FREDERICK J. SHEPARD, JR., *Secretary*, 125 Walnut Street, Watertown 72, Mass.

1914

Congratulations to Ernest Kerr, who has been made president of the What Cheer Mutual Fire Insurance Company of Providence, R.I Ernest has been executive vice-president for some time and has been associated with the Factory Mutual Insurance group since graduation. — Porter Adams has had another accident, but it never downs his spirit. This time he has broken his left arm. Porter's health had improved so much that with the aid of crutches he has been able to get to almost any place he desired to go. He even flew as copilot in a plane this summer. Like most accidents, the broken arm occurred at home. Porter slipped on polished vestibule tiling. He is now coming along nicely. — Although Bob Doremus is one of the most difficult fellows from whom to get a letter and has a host of other duties, we now find him on the board of consulting and contributing editors of *Heating, Piping, and Air Conditioning*. If your Secretary's memory serves him correctly, he has seen Bob's name associated with some other trade publications.

Walt Keith made his annual pilgrimage to the Greater New York Dental Association meeting which is held each year at the Hotel Pennsylvania the first week in December. As your Secretary is usually in New York at that time, he and Walt have for the past few years managed to get together for a little private reunion. Walt was exhibiting a new line of products, including an acrylic compound for dentures and some new abrasive tools. He has recently become a member of the American Dental Association and is well established in a very nice small manufacturing business of his own, called the Hygienic Dental Rubber Company. Walt's son, who was graduated from the Institute in 1941, is a captain in the Ordnance Department and is stationed at the Southwestern Proving Ground in Arkansas.

Ross Dickson was found in an enthusiastic mood because of the way a lot of members were helping him put over the class quota of the Alumni Fund. As the goal is still quite a way off, Ross would appreciate a prompt response from those who have not yet contributed. Unfortunately a con-

flict of meetings prevented your Secretary from getting together with Charlie Fiske to see if some sort of New York meeting should not be arranged for later in the winter. — Did you read Frank Ahern's article on "Safety in Postwar Homes" in The Review for November? Frank has established quite a national reputation for himself for his work in the safety field, particularly in regard to fire prevention. Frank's son, now an ensign, is stationed at the Norfolk Navy Yard.

On November 30, when in Washington on one of his frequent trips, your Secretary had the great pleasure of dining with Brigadier General and Mrs. Waitt. Alden was just back from a two months' trip to the Pacific, flying more than 25,000 miles during that time, much of which was passed in bucket seats or riding on mail sacks. It would be well worth holding a reunion just to listen to Alden tell of interesting things he saw and did. Not only did he visit the top theater commanders but also the local commanders of more areas than most of us even knew existed. Your Secretary tried to make note of a few of these spots, which included the three principal cities in Australia, stops going and coming at Hawaii, and other such places as Guadalcanal, Biak, New Caledonia, Bougainville, Tarawa, Saipan, Tinian, Jaluit, the Johnston Islands, the Russell Islands, Kwajalein, Guam, New Guinea, and Halmahera. Alden's son Tom was commissioned a second lieutenant in the Chemical Warfare Service on November 11, which was Alden's 27th wedding anniversary. His trip through the Pacific prevented him from being present at the graduation exercises.

Before your Secretary had gone out to join Alden for dinner, Admiral Tom Richey came up to the hotel for a very pleasant visit renewing the reunion of last June. Tom is still at the Joint Chiefs of Staff headquarters but has had some additional duties assigned to him. — H. B. Richmond, *Secretary*, General Radio Company, 275 Massachusetts Avenue, Cambridge 39, Mass. Charles P. Fiske, *Assistant Secretary*, 1775 Broadway, New York 19, N.Y.

1915

You have done it again! You've put the Class over the top. $3,179.50 (108 per cent) from 150 men (85.2 per cent) represents the biggest total that we've ever had and at the moment of writing beats out any other class for many years. In doing this you have contributed a great help to Technology, and to you all go my many thanks, my many blessings, for your loyalty and generosity. To my classmates who remembered me so thoughtfully at Christmastime with cards and messages, I extend my warm appreciation for their friendship. Phil Alger's original poetry, Tess Hilton's and Margaret Neal's extremely personal anticipations of our 30th reunion combined with their Christmas wishes, and Loring Hayward's unusual blueprint of his family were outstanding.

The latest class marriage is that of Bert Adams' daughter, Jane, who was married to George Irakly Toumanoff '42 in Brookline on the 14th of November. More class children are in the service: Chet Runels' (Lowell) middle daughter, Mary Elinor, is in the Marines at Quantico, Va. Mrs. Runels says she writes most interesting and amusing letters of her service experiences and seems very happy there. Lieutenant Colonel William Eustis Brown, C.P.H., is now in charge of the Balkan Medical Mission of the United Nations Relief and Rehabilitation Administration with headquarters in Cairo.

A fascinating letter has come from Ralph W. Mendelson, a lieutenant colonel in the Medical Corps, Headquarters, Civil Affairs Staging Area, Fort Ord, California, who writes: "Permit me to thank you for your very nice letter of December 1. Yes, I spent several months in England, most of the time fighting the doodlebug war in London. At present am enjoying the very salubrious weather at Ford Ord, California, much more balmy than the bomby type in Britain. Am on my way to another theater of operation with a stopover here. . . . News about me? Well, between wars I practice medicine in Albuquerque, N. M. I spent 10 years as principal civil medical officer of health for the Siamese government. Also had a year in the Balkans and a year teaching tropical medicine. Have been married to the same good-looking woman for the past 27 years — that's some kind of a record — and have the very best daughter in the world, who unfortunately lost her pilot husband in the war. . . . My observations? The older we grow, the less we seem to know. Technologically — great advances; human relations — terrible. Forgotten the name of the philosopher who stated, 'Were it not for the pleasures of life it would be worth living.' Well, the old bird should be alive now, he would certainly enjoy himself. . . . Again many thanks for your letter and the season's greetings to you and the Class." It is most interesting to have this letter from Ralph and to know the important work he has been doing. This was an answer to the letter I sent to all our classmates in the service with our holiday greetings.

The mellowing of the years is coming over us. Last April, Bill Brackett inaugurated what has become a beautiful custom by inviting a group of local men to a luncheon at his home in Newton, Mass. This was followed by a similar party given by Larry Landers on a warm Saturday in May in his garden. In June, Albert Wechsler had us out to his house. The summer gave us a chance to discuss these good times, and in December, Max Woythaler threw a dinner party at the University Club, Boston, with a record attendance of 31 men, which served as an opportunity for the first discussion of our coming 30th reunion next June. Pending a similar meeting we hope to have with the New York and Philadelphia groups and questionnaires to the Class, it was tentatively decided to hold the reunion. Definite details will, of necessity, have to follow after these other meetings. We certainly have a splendid spirit among this friendly group of classmates with Al Sampson offering to give the next dinner for a committee meeting to discuss further the reunion plans. This we hope to have in Boston in February.

Present at Max's dinner were the following: Bert Adams, Bill Brackett, John Dalton, Sam Eisenberg, Viking Enebuske, Fanny Freeman, Abe Hamburg, Loring Hayward, Frank Herlihy, Seward Highley, Wink Howlett, Larry Landers, Carleton Lovell, Azel Mack, Archie Morrison, George Moulton, Pete Munn, Frank Murphy, Wally Pike, George Rooney, Al Sampson, Frank Scully, Henry Sheils, Ed Sullivan, Speed Swift, Bob Warren, Elmer Waters, Al Wechsler, Herb Whitcomb, Carl Wood, and Max Woythaler. Henry Shiels resurrected Carleton Lovell, another of that Course I gang whom we haven't seen since graduation. Many of these fellows came long distances for the dinner, including Speed Swift, from New London, N. H.; John Dalton, from Lawrence, Mass.; Loring Hayward, from Taunton, Mass.; Al Sampson, from Beverly, Mass.; and Fred Waters, from Marblehead, Mass. Seward Highley was a welcome returnee from three years' absence down south. Our records disclose that Loring Hayward has never missed a class reunion or a class dinner. Nice going to loyal old Loring! Whit Brown had planned to come from Concord, Mass., but was laid up by sudden illness. I telephoned him later and am happy to report that he has completely recovered.

From the Dwight Building Company, New Haven 3, Conn., Vincent Maconi writes: "My son, Richard, who was graduated in February, has been in the south Pacific for a few months. I have not heard from him for a week or more and in all probability his ship has taken part in one of the recent invasions of the islands just north of New Guinea. My wife and I are hoping for the best. My younger son, Norman, who attended Yale from July to October, enlisted in the Navy just before his 18th birthday on the 16th of September. He passed the special Eddy test and is going to be trained as a radio technician. He was prepared at the Great Lakes Training Camp in Illinois and will be assigned to some college for further training. I feel confident that Norman will return to college after the war and perhaps take a post-graduate course at M.I.T. after he has finished his work at Yale."

The prize Christmas letter is one from St. Elmo Tower Piza, who is now at the United States Embassy in England, written to your Secretary's secretary. We shall reprint it, strictly censored, next month. I hope that next month's notes will report the New York-Philadelphia reunion committee meeting so that we can begin to formulate definite plans. Aside from the holiday spirit I am moved to wish you all, all the best for all you've done to "help Azel." — Azel W. Mack, *Secretary*, 40 St. Paul Street, Brookline 46, Mass.

1917

The reminder that these notes were due came up with a folder completely empty of clippings, correspondence, or other material. By a fortunate coincidence, however, Tubby Strout had decided that this was a good time to have lunch with a few of us in the Boston area who had answered the call for previous meetings. His secretary finally rounded up Rudy Beaver, Warren Tapley, Win Swain, who brought his brother Snooks, Dean Lobdell, Bill Rausch, and Ray Stevens. Tapping this source of information revealed the following interesting items.

Lewis W. Douglas, President of the Mutual Life Insurance Company of New York, has been elected a director of General Motors Corporation. — In addition to screening information from Axis and neutral

sources for United States use, Bob Scannell is helping with surveys of industries in recaptured areas with a view toward rehabilitation. He is assistant chief of the intelligence division of the Foreign Economic Administration in New York. — Jane Tapley, daughter of Warren Tapley, has been at Tiffany Foundation at Oyster Bay since her graduation from Wellesley last May. The work is connected with the government, and very secret! — William F. Dean, of Johnstown, N.Y., has come to Boston to help William H. Coburn and Company, investment councilors, over their manpower shortage. For the duration he is living at the University Club in Boston and expects to return to Johnstown eventually. — In the same field, with Spencer, Swain and Company, is Win Swain's brother, Francis W. Swain, graduate at Gardner Lake engineering course. He has one of the most complete collections of anecdotes and short stories in the New England area.

Arthur Merkel Miller is reported to be struggling with his clay-aluminum process for the Tennessee Valley Authority. The most recent news of Vic places him as engineer in charge of industrial development of the T.V.A. area. — RAYMOND STEVENS, *Secretary*, 30 Memorial Drive, Cambridge 42, Mass. PHILIP E. HULBURD, *Assistant Secretary*, Phillips Exeter Academy, Exeter, N.H.

1919

A number of the Class have called on your Secretary during the past few months but unfortunately have found him out of town. Some of these were Bill Banks, Al Richards, and Jesse Stam. Bill Banks finally connected with your Secretary early in December and bowled three games with him at the Lexington Avenue bowling alleys and demonstrated his prowess at the sport by rolling a 191 game.

Notes have been received from Lewis E. Hartman of Miller and Hartman, Lancaster, Pa.; from Bob Hackett of Nichols and Company, Inc., Boston, Mass.; from Karl Rodgers, Bell Telephone Laboratories, New York; from John J. Falkenberg of the Falkenberg construction company, Denver, Colo., and from Fred Given of the Bell Laboratories. Colonel Robert R. Litehiser has left Newport News, Va., to become assistant commandant at the Transportation Corps School, New Orleans 12, La.

A December news release regarding Bernard S. Coleman follows: "Bernard S. Coleman, secretary of the Tuberculosis Committee of the New York Tuberculosis and Health Association and of the Tuberculosis Sanatorium Conference of Metropolitan New York, since 1934, is resigning to become director of the Council of National Jewish Tuberculosis Institutions, with headquarters in Denver, Colo. This appointment of Mr. Coleman becomes effective on January 1. Offices held by Mr. Coleman, who has been active in the field of public health and tuberculosis for more than 20 years, include: municipal relief director, State of New Jersey Emergency Relief Administration; chairman, Tuberculosis Committee, American Hospital Association; and secretary, Industrial Hygiene Section, American Public Health Association." — EUGENE R. SMOLEY, *Secretary*, The Lummus Company, 420 Lexington Avenue, New York, N.Y. ALAN G. RICHARDS, *Assistant Secretary*, Dewey and Almy Chemical Company, 62 Whittemore Avenue, Cambridge 40, Mass.

1920

Reunion plans are progressing, and the date has been set tentatively from Thursday, June 21 to Saturday, the 23d, followed by the Alumni Banquet at the Hotel Statler, Boston, on that Saturday evening. I cannot tell you the place at this writing as we are having temporary difficulty in lining up just what we want. You will hear from me by mail the moment we get this settled. The way things are shaping up, I can definitely promise you that this is going to be by far the biggest and best reunion we have had. Mark the date on your calendar and make sure that nothing interferes.

I have just received word, with no other details, of the death from pneumonia of Charles J. Muller on November 16 at Pittsburgh.

Dean Willey has been appointed assistant general manager in charge of engineering, maintenance, and mechanical departments of the New York, New Haven and Hartford Railroad. Dean has been with the New Haven since his graduation and has been general mechanical superintendent for several years. Paul Bigler is with the Lone Star Cement Company, 342 Madison Avenue, New York. Rolland Case has been promoted from colonel to general and has moved from San Antonio to New York City. Major Alexander A. Nikitin is now at Copperhill, Tenn. — HAROLD BUGBEE, *Secretary*, 7 Dartmouth Street, Winchester, Mass.

1921

Dugald C. Jackson, Emeritus Professor of Electrical Engineering and former head of the Department, will be honored at a dinner tendered by members of the Institute staff and former students on the occasion of his 80th birthday on February 13. On behalf of the entire Class and particularly the members of Courses VI and VI-A, we extend to Professor Jackson heartiest congratulations and wish him many happy returns of the day.

Robert R. Neyland, I, a brigadier general, is now commanding the Calcutta section of the Army Service Forces. He is the former head coach of the University of Tennessee "Vols" and makes his home in Greenville, Texas. Military statistics of the Class still show 140 members in service, although honorable discharges are beginning to appear on the records and four men are now back in civilian life. The latest to report is Jackson W. Kendall, XV, formerly a lieutenant colonel of antiaircraft, who has left his Richmond, Va., assignment to return to his home, 1295 Elizabeth Street, Pasadena 6, Calif. — Philip H. Hatch, VI, is one of four Technology men on the recent list of promotions announced by the New York, New Haven and Hartford Railroad. Phil, who has been with the road since graduation, now becomes the general mechanical superintendent.

David O. Woodbury, VI-A, was the guest speaker at the "City of Boston" luncheon held during the convention of the International Municipal Signal Association. The last issue of the "Technology Bookshelf" lists Dave's latest book, "Beloved Scientist: Elihu Thomson," published by Whittlesey House in 1944. Also listed are: "Victories of Army Medicine" (Lippincott, 1943), by Brigadier General Edgar E. Hume, VII; "Fighter Facts and Fallacies" (Morrow, 1942), by John G. Lee, II, IX; "Modern Marine Engineer's Manual" (Volume 2, Cornell Maritime Press, 1943), edited by Alan Osbourne, XIII. — Welcome greeting cards came from a number of the Class, including: Marie, Stuart, and Margaret Marie Nixon, Ray and Helen St. Laurent, Chick and Frieda Kurth, Max and Ethel Burckett, Elisabeth and Lieutenant Colonel Dugie Jackson.

The advent of 1945 should have reminded you that our 25th reunion is only a little over a year away. Place and date are fixed, and only details remain to be settled. It is planned to publish a complete class history if you will co-operate by sending a detailed résumé to your Assistant Secretary now. — RAYMOND A. ST. LAURENT, *Secretary*, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, *Assistant Secretary*, Federal Telephone and Radio Corporation, 591 Broad Street, Newark 1, N.J.

1922

Through Don Carpenter, Chuck Brokaw, a lieutenant colonel, sends his best regards to the gang. He reports that he is down to 168 pounds and tanned as a native. Chuck is in the Philippines and says that they will continue to push on relentlessly, especially as soon as they can begin to get supplies direct from the United States. He is now in the G-4 Planning Section and says it is not only the most interesting work he has had so far but allows him to contribute his training and experience to the best advantage. He prophesies severe fighting ahead because the Japs are tough fanatics and fight until they are annihilated. They should be particularly unhappy and apprehensive now that Chuck has a hand in planning the future moves against them.

The public information service of the American Red Cross recently had an interesting story about Nathan Weed, assistant field director, who has been in the Pacific theater for quite a few months. He was part of a small allied landing party seeking to land at Finchaven, but through some circumstance the party landed several miles away in enemy territory. In the ensuing fracas Weed and his co-workers took care of the wounded under the most trying conditions. I know that those of our Class in the armed services will be glad to know that they have at least one classmate who is engaged in the humanitarian side of warfare.

George R. Prout, who stayed on until 1923 to get his M.S. in Course VI-A, was made manager of the air conditioning and commercial refrigeration division of General Electric at Bloomfield, N.J., on July 1. Prout has been with General Electric since graduation, first in Lynn and then in other parts of the New England district, and from 1924 to 1939 was motor and industrial control specialist in the southwestern district with headquarters in Dallas, Texas. In 1939 he became manager of sales in the industrial control division at Schenectady, and in 1941 he became manager of the industrial control division. We congratulate

Prout on his continued course upwards and wish him the best of success in this job.

Dale Spoor who, for several years, has been in charge of the St. Louis branch of Air Reduction Sales, has been transferred back to New York, where he is in charge of the dealer sales program of Air Reduction. He is living in Bronxville. We wish him the best of luck and, while we know St. Louis is sorry to lose him, we are glad to have him back in New York. — CLAYTON D. GROVER, *Secretary*, Whitehead Metal Products Company, Inc., 303 West Tenth Street, New York, N.Y. WHITWORTH FERGUSON, *Assistant Secretary*, Ferguson Electric Construction Company, 204 Oak Street, Buffalo, N.Y.

1923

A great many interesting things are being done by members of our Class in this war — by men both in and out of uniform. Your Secretary doesn't want his readers to think, because so little appears in these notes about them, that he doesn't know of cases worthy of mention here — a small percentage of the total, perhaps, but enough to keep the column going. The trouble is that war work contributed by this Class is likely to be important and under restrictions as to publicity. Much of it, however, could be (and perhaps in some cases already has been) cleared for mention in publications. Those items your Secretary wishes you would send in. He would also be grateful to any members who could get cleared for publication such activities as can be discussed here. The movement of men in the armed forces is usually not properly publishable, although many individual cases are, but your Secretary doesn't feel free to include those he knows about without some idea of how much it is appropriate to say.

One case which can now be reported is that of Atherton Thomas, a lieutenant colonel, who, according to a release from the Consolidated Edison Company, was planning to leave the service last November 1, to become assistant personnel director of the company. Tommy entered the Army with a major's reserve commission and became assistant post quartermaster at the Atlantic City basic training center of the Air Forces. Later he was co-ordinating officer of troop movements, adjutant, and personnel officer. His new assignment at Consolidated is to fit employees discharged from military service into the jobs best for them with the company. This is a continuation in many respects of the personnel work he has been doing for over a year, which was the reassignment of Air Forces men who had finished a tour of duty in Europe, had been home on furlough, and were being called back to active service. — HORATIO L. BOND, *Secretary*, 457 Washington Street, Braintree 84, Mass. JOHN M. KECK, *Assistant Secretary*, 207 Bloomfield Avenue, Bloomfield, N.J.

1926

A Christmas card brings news to the Secretary for the first time that on last May 22 the Eben Haskells added a son, Robert Emmons, to their family of four daughters. — Elton Staples, functioning as a metallurgical-mechanical engineer in the Quartermaster Corps, recently went overseas. Mrs. Staples plans to return to Wellesley with the family for the period that Elton is away. — John and Gay Longyear are probably the Class's prime gardeners. At their home near Dearborn, Mich., they raise herbs, which they generously share with their friends.

M. L. Ash, Jr., a lieutenant colonel in the Ordnance Department, who is stationed in Detroit, reports that he and his wife expect their third child early in the New Year. — Martin Grossman visited the Institute recently. He has an important war job with the Hercules Powder Company at Blacksburg, Va.

From recent address changes the Secretary notes that Captain George A. Fogg has been attending the School of Military Government at Charlottesville, Va.; that Eugene A. Chase is now at 10 East 40th Street, New York; and that Robert W. Richardson has recently become a lieutenant commander and is stationed at a shipyard in Seattle. — Charles M. Pickett, Jr., a major in the Engineers, is now in France. — JAMES R. KILLIAN, JR., *General Secretary*, Room 3-208, M.I.T., Cambridge 39, Mass.

1927

Our detective agency has discovered that Frank von Brecht is a member of the research staff of Aerojet Engineering Corporation, Pasadena, Calif., which is doing advanced work on jet propulsion. We also find Bob Hatch with the Texas Company in New York. Gordon E. Thomas has been promoted to a lieutenant colonelcy and is living at 2501 Forest Glen Road, Silver Spring, Md. Other new addresses received are: Morgan A. Collins, Jr., General Aniline and Film Corporation, 230 Park Avenue, New York, N.Y.; Arthur J. Connell, 53 Yale Street, Winchester, Mass.; Harold E. Lester, 75 South Harrison Street, East Orange, N.J.; and Marcus P. Robbins, 126 Country Street, Attleboro, Mass.

Silent members! Let us hear from you! — JOSEPH S. HARRIS, *General Secretary*, Shell Oil Company, Inc., 50 West 50th Street, New York, N.Y. DWIGHT C. ARNOLD, *Assistant Secretary*, Stevens-Arnold Company, Inc., 22 Elkins Street, South Boston 27, Mass.

1933

We have received the following interesting report from Ed Atkinson: "As it has been a year or two since any news of Course V has appeared in our notes, I thought I'd bring things up to date. The period since the last notes on Course V classmates were recorded in The Review has been marked by the reappearance of two men who had more or less dropped out of sight. At the recent New York meeting of the American Chemical Society, I saw Harry Steinman for a few minutes, for the first time since Commencement Day. He looks well and is possessed of the same old enthusiasm. At present he is with the United States Public Health Service at Johns Hopkins Hospital in Baltimore. We understand that Harry, during his work for the doctorate at Columbia a few years ago, succeeded in selling the chemistry department there the idea of using duplicate-page notebooks similar to those which we had used back in quantitative analysis. During the summer of 1943, I looked up from my job of interviewing candidates for the Army Specialized Training Program to find none other than Charley Cullison smiling at me. During his stay here in Durham, we consumed a number of Cuba Libres. It seems that Charley made the mistake of remaining single and of working for a company which sought few deferments; hence he was drafted in 1942 and spent a pleasant winter as a buck private with the harbor defenses in Boston. When the A.S.T.P. got under way in 1943, Charley was assigned to it. Since at the time he passed through our classification unit here, there were no openings for chemists, we sent him off to become an electrical engineer at the University of Delaware.

"I see Bill Adams and Irv Crane often. Irv is the proud father of Susan Ruth Crane, born October 28, 1943. At the American Chemical Society meeting in New York, I saw Bob Heggie, Earle McLeod, and Mike Eitelman. Mike is now directing some research for National Aniline and lives in Hamburg, N.Y. As far as we know, King, Moran, Garcelon, Ehrlich, and Hillenbrand are still located where we had them in our last report. Herlich, Kaplan, Green, Parker, and Bruce are in the Army. I hear about once a month from Alfred Peter Bruce. He has risen to the rank of corporal after going to England with a signal detachment early in 1944. This year he has been enjoying the sights of rural England, using a bicycle for transportation. He also managed to stay out of London during the robot bombing.

"The past two years have brought a variety of experiences to me. My wife Helen died in February, 1943, after a long illness. I kept my home here in Durham and managed to get along, with the help of my neighbors. On August 12, 1944, I was married to Lorraine Crittendon of Springfield. Lorraine was graduated from the Yale University School of Music and last year taught violin at Rollins College. The Atkinson family, therefore, has a common traditional interest in the 'Harvard.' Since April, 1943, the University of New Hampshire has seen all phases of the Army Specialized Training Program. The first few months were spent in classifying men for the program. Thousands from all over the country were here for periods running from three days to six weeks. From October, 1943, to April, 1944, we had about 800 fellows here in the basic phase, and our advanced phase trainees stayed until October. We now have about 200, but this ends as far as we are concerned on January 1. I have a reasonably up-to-date file of addresses of the fellows in our Class. I'd enjoy hearing from you. I'm still at the University in Durham, N.H., and still a chemist."

Did you see the notices of the wedding of John F. Longley and Lillian N. Wallender on November 4? They were married in the Fort Myer chapel and planned to live in Arlington. Robert A. Fuller was married to Janet Swanson on November 12. They were to live in Norfolk, Va., where he is stationed. From the Dallas *Times Herald* we learn that Gunter Kohlmann is now connected with the School of Engineering of the Southern Methodist University, teaching air conditioning, refrigeration, internal-combustion machines, heat and power, metallurgy, and electrical laboratory work.

It is with deep regret that we report the death of Charles MacNeil on November 18 and repeat here the news release of aeroproducts division of the General Motors Corporation: "Charles S. J. MacNeil, 34, chief engineer of Aeroproducts Division, died of a heart attack after completing a forced landing in his cabin plane near Brazil, Ind., after he became ill. Mr. MacNeil who was the coinventor of the Aeroproducts automatic, constant speed propeller, had addressed the Air Transport section of the Society of Automotive Engineers at Kansas City two days before and was en route home from this meeting when the fatal attack took place. Despite his youth, he was recognized as one of the foremost propeller authorities in the country. The young inventor was born in Malden, Mass., on June 28, 1910, and was graduated from M.I.T. with a B.S. degree in aero engineering. He first became associated with W. J. Blanchard, coinventor of the Aeroprop at Curtiss-Wright, immediately after graduation, and together they formed a partnership in 1935 which continued through Engineering Projects, Inc., and the aeroproducts division where they had directed the development of the propeller from blueprints in 1940, to a heavy contribution to the war effort today. It was the overwork occasioned by Mr. MacNeil's many responsibilities which no doubt contributed to his death. Mr. MacNeil was a member of the Institute of Aeronautical Sciences, the Society of Automotive Engineers, the Dayton Engineers Club, and the Masonic fraternity. He leaves his widow, Elise, a daughter, and his mother, Mrs. Charles S. J. MacNeil, of Malden, Mass." The Class had reason to be proud of Charlie! — GEORGE HENNING, JR., *General Secretary*, Belmont Smelting and Refining Works, 330 Belmont Avenue, Brooklyn 7, N.Y.

1941

High priority projects originating in the Military Planning Division and your Secretary's failure to foresee their convergence on the day when class notes were due competed with the dearth of news trickling in from you as excuse for the absence of this column from the January notes. We apologize and seek your assistance.

Meanwhile, we record the engagements of Louise Bowden to Ken Spaulding, now at American Smelting and Refining Company at Perth Amboy, N.J., and of Helen Field Rodman to Charles Wyckoff, who is doing research work for the Navy. Louise Van Dermark has become Mrs. Alan Cunningham. Margaret Lombard is engaged to Harry J. Heimer, a lieutenant in the Air Technical Service Command. Harry's permanent station is Wright Field, Dayton, Ohio. He has been on temporary duty at Cal Tech in Pasadena, doing graduate work in aeronautics. A May newspaper clipping related the June wedding plans of Jane Amick and John Brumbaugh. John is connected with a war plant at Belle, W. Va. Ralph Wilts is taking instruction in B-17's at the Army Air Base in Columbus, Ohio. During the past summer Stella Tanner was married to William P. Burton. Eugenia G. Burnett is Mrs. Herman Affel, Jr., as of last April. Ted Guething was best man at their wedding. Herman is a physicist with the Bureau of Ordnance of the Navy Department. Chifan K. Lee received quite a notice recently on his study of the rayon production facilities of the American Viscose Corporation.

Madelaine Elizabeth Blomstrom is reported engaged to Benjamin Clyde Scott, Jr., a lieutenant, junior grade, in the Naval Air Corps. Madelaine was graduated from Simmons in 1942. Ben is at present stationed in Pensacola, Fla., taking intermediate flight training. June Muriel Archibald's engagement to Harold A. Lent has been announced, and so has that of J. Luise Trimble and Robert C. Anderson. Both Luise and Bob are chemists in the research department at Merck and Company, Rahway, N.J. Doris Jane Perry is engaged to Captain Fred Whitaker — a Philadelphia affair. Priscilla Henderson Hall is engaged to John Eric Bone, a sergeant in the Marine Corps Reserve. From reliable sources we hear that John was at home for Christmas.

Ziya Kirman has left the States and is now back in Turkey. Ed Hardway, who had done such notable work in Washington, is now listing a Jacksonville, Fla., address — the initials confuse us. Ed is a lieutenant in the Navy. John Hanssel is a captain in the Field Artillery, A.P.O.-ing out of Los Angeles. George Clark, a major in the Army, is also somewhere in the south Pacific. According to Les Corsa, who is finishing the third year Med at Harvard, George left Philadelphia with — this writing is poor — Evelyn Battles, is what I make out. Evelyn was a Philadelphia girl, thus accounting for our inability to see George more than once or twice during his stay in that city. Also connected with our Japanese arguments are John C. Potter, a lieutenant in the Army, and Henry Pohndorf, an ensign.

A.P.O., New York, covers the addresses of Private John Knox, Captain Ted Walkowicz, Private Bob Wooley, Major José Andino, and Captain Jim Cheek. Listing United States stations are Captain John Porter at the 8th Weather Region in New Hampshire, Major Harold Banks (although formerly A.P.O.-ing out of New York City), Major Sherwood Burnett, Lieutenant Bob Kellner, and Major Leo Alpert in Asheville, N.C. R. Wallace Blake, who has been working heretofore with a commercial airline, has joined the government fliers and is now A/C Blake at St. Mary's College, Calif. Bob W. Blake, Jr., a captain in the Army, who returned from the European theater of operations long enough to walk the aisle, is back in France. We have a long letter from Bob which we will include in next month's column.

A card came from Ruth and Bill Cadogan, who are out Detroit way. Mrs. Cadogan was the former Ruth Brooks of Arlington, Mass. Charlotte (Douglass) and Will Mott sent season's greetings from Suffern, N.Y.; Jud '40 and Mrs. Rhode, from the Experimental Station in Wilmington; Alice and Les Gott, from Watervliet Arsenal, N.Y. We were pleasantly surprised to hear Les's voice on the telephone one day, and a few hours later, Les, Alice, and Richard dropped by. A visit to Bob Alfred's home that afternoon revealed that Bob was then in France and had met Butch Berman in southern France on D-Day plus two.

We have received more information about the death of Howard W. Wade. Lieutenant Wade was commissioned in 1941 and was assigned to the Apa Locka Airfield in Florida. He applied for training as a flier and after winning his wings was assigned to Pensacola, Fla. One day early in June Lieutenant Wade was on a training flight when his plane caught fire. Severely burned, Wade parachuted from the plane. He died at the Naval Hospital at Vero Beach, Fla., and was interred in the national cemetery at Washington. Our Class learns of this tragic event with sorrow. — STANLEY BACKER, *General Secretary*, Philadelphia Quartermaster Depot, 2800 South 20th Street, Philadelphia 45, Pa. JOHAN M. ANDERSEN, *Assistant Secretary*, 12 Ware Street, Cambridge 38, Mass.

1942

In the first place, your new assistant to the assistant to the assistant is somewhat at a loss how to obtain news for this column. Of course, we get the usual clippings from the Alumni Office and might start with those. It seems that Dave Mitchell is now a first "looey" and is working in the vicinity of Detroit turning out jeeps, tanks, and such, for the Army Ordnance. Also we are told that Herb Howell has taken the fatal step. The lucky girl is Carol Eckert of Redbank, N.J. Another one of the boys, Rex Beisel, has evidently just invested in a diamond for Mary Curley of Bridgeport, Conn. And what do you know — Owen Gore has finally broken down and by the time this gets into print he and Lorraine Celia of Flushing, Long Island, will be married.

Your correspondent has received a reasonably long communication from Dave Nickinson. According to his own words, he is haunting the radiation lab day and night, along with Stan Golembe and Bob Jacobson, both of Course VI fame. Incidentally, Jake is rooming with George Schwartz. Dave reports personal contact with Johnnie Minges while exploring the wonders of Kendall Square. Johnnie seems to be in good shape and evidently hasn't succumbed to the khaki as yet. While speaking of boys who are still around the Institute, we mustn't neglect to mention Lusty Lustwerk. Just where he is nobody seems to be able to find out, although he may often be seen wandering around the Institute in his own inimitable manner. The Christmas card which the Charlie Ruckstuhls are sending around indicate that he is quite a family man — what with a real little girl of about two years! Thank goodness, she doesn't take after Charlie! Although not at the Institute, Lou Rosenblum and Rod Flinchbaugh are pretty close by, over at Polaroid. It seems that Rod has taken himself a wife somewhere along the line. Harvey Kram is stationed at the United States Naval Mine Warfare Test Station and living quite contentedly with his wife somewhere around Solomons, Md. Another report says that Mort Goulder of Course VIII fame was lately seen with a most luscious Marine. Mort's in the Navy now and has been spending quite a bit of time in Washington. Dave Greenberg has been home on leave from the Pacific wearing a chestful of medals, ribbons, and so on. The latest hot tip is that Leo Penn is now a proud papa. Also, he is a first "looey" somewhere in the Pacific.

I hope the rest of the Class will excuse me if I devote one whole paragraph to

Course V. Brad Darling shows up once in a while in a Navy uniform and seems to have put some of the Course VI men to shame with his work in the radar course. His present whereabouts are somewhat of a mystery. Howard and Mrs. Evans, the former Eloise Humez, are living the life of domestic tranquillity while Howard teaches a considerably younger generation of Tech students. Bernie Pitt has migrated down towards Tennessee along with his better half, the former Ruth Berman'39. Jack Davis and Vic Frank are both with Dewey and Almy, Jack having married Ann Linten and Vic having married period. How about giving us some dope on this? Your correspondent can usually be found working over some of the V-12 students in Qualitative Analysis — heaven forbid!

Believe it or not, Jim Girwood of 8.03 fame (as the lad who took the exam just to help lower the class average) managed to get through radar school in the Marine Corps and is now to be found along with his much better half down at New River, where, he reports, the officers really throw parties whenever somebody gets transferred. Ed Edmonds, to the best of our knowledge, is or was testing some kind of airplanes for the Army down around Baltimore. Whoever thought we should see a Course X man testing airplanes? Oh well, that's what the Army does for you. Charlie Smith is still in Cleveland, running his plant better than ever. We are told that some of his employees were a little singed in the recent Cleveland explosion. Let's hope it won't tie up his plant too much and force Charlie to miss his Sunday foursome. Incidentally, we understand that Mrs. Smith, the former Rhea Day, is quite a golfer. Indeed, the fact that Charlie has been taking lessons lately means the situation must be rather serious. — FREDERICK W. BAUMANN, JR., *General Secretary*, Orchard Lane, Golf, Ill. *Assistant Secretaries:* KARL E. WENK, JR., 11 Ledge Road, Old Greenwich, Conn.; S. YOUNG TYREE, JR., Room 2-215, M.I.T., Cambridge 39, Mass.

1943

It is with the very deepest regret that we record the death of Gustavus Hindman Miller Smith. Gus was graduated from the Institute in June, 1943, and completed Officer Candidate School at Aberdeen Proving Ground a few months later. He was transferred to the Corps of Engineers and assigned to a combat engineer battalion. His unit was sent to France soon after D-Day. Gus was killed in action on October 8. We know no better way of expressing our feelings of sympathy to Gus's family and friends than by repeating John Milton's words written on such an occasion as this:

Yet once more, O ye laurels, and once more
Ye myrtles brown, with ivy never sere,
I come to pluck your berries harsh and crude,
And with forced fingers rude
Shatter your leaves before the mellowing year.
Bitter constraint, and sad occasion dear,
Compels me to disturb your season due;
For Lycidas is dead, dead ere his prime,
Young Lycidas, and hath not left his peer:
Who would not sing for Lycidas? he knew
Himself to sing, and build the lofty rhyme.
He must not float upon his watery bier
Unwept, and welter to the parching wind,
Without the meed of some melodious tear.

. . . . .

The mailbag is small this month, and I have only two letters to quote from. The first, from Hans Haac, says that he has seen my report that he was listed under "parts unknown." He answers, however: "I spent some very pleasant days at home and then went off to Camp Reynolds, where I was stationed for about a month. I enjoyed all sorts of shots and other processing and plenty of social life in the surrounding towns. At that time the ports of embarkation were overcrowded and most shipments were domestic. I ended up at Camp Gordon, Ga., in an Ordnance heavy maintenance company doing small arms work. Our outfit has been transferred to Fort Benning. I was about to leave on furlough when I broke my ankle. Right now I am being reconditioned, doing all kinds of exercises, and rapidly getting into the best shape I have ever been in. The food is marvelous here at the hospital. Benning is a beautiful but overcrowded post. My outfit lives in tents, although we do have stoves. I haven't left the post since I have been here."

Curt and Barbara Smith, who are living in Rehoboth, Del., have a word to say about the parties at Fort Miles. "You should drop in for one of the parties at the Officers Club. They put the old Tech fraternity brawls to shame. They are terrific. I think the tea and after-dinner dance combination on Thanksgiving Day was about as rough as any Barbara and I have ever seen. It reached the point where it seemed almost blasphemous after the quiet dignified Thanksgivings of New England." Not the Curt we used to know, is it? Barbara, what have you been doing to that man!

Lydia Shaw of Chichester, N.H., and Fred Brauer are shortly to be married, as are Virginia Finlay of Long Island and David Moyer. From New York we hear that Rhoda Arons and Elliott Levinthal are engaged. That's all for this month. Turn to the end of the next issue of The Review, and I shall have more news to give you — that is, if you keep the mail piling into my mailbox. Hint! — CLINTON C. KEMP, *General Secretary*, Barrington Court, 988 Memorial Drive, Cambridge 38, Mass.

1945 (10–44)

Fellows, we're Alumni! Luckily, some of us are graduated. And there are others to whom the fortunes of war have not been so kind. The draft and Engineers Reserve Corps first grabbed many of our brother Tech men. Then the Navy sent V-12's from Drexel Institute, General Motors Institute, and Lehigh University. Many of these Navy men could not be graduated because of deficiencies in transfer credits. We all hope that some day they will be able to earn their degrees. But they are all Alumni, for the Alumni Association welcomes them after one full term at the Institute.

In the rush and confusion of the last days prior to graduation some of us may have missed the last official acts of our undergraduate Class. We presented Dr. Compton with a token deposit for our class gift, a memorial plaque for those Technology men who have died in this war. Our Class also contributed a new wooden class ring to replace the one that was lost three years ago. We voted to be called the Class of 1945 and recommended the new song, "Sons of M.I.T.," for adoption as the official alma mater song of our school. There will be no immediate action on our recommendation, for the song must stand the test of time before it can be finally adopted by the Alumni.

You are all eager for news of your friends, so here's the story to date. The Navy has sent the following V-12's to Naval Reserve Midshipmen's School, New York 27, N.Y., for either deck or officer training: M. E. Apple, Jr., C. E. Arnold, R. D. Baldwin, Jr., G. H. Binns, M. A. Biondi, J. Brannan, L. M. Brindis, S. M. Brown, Jr., C. H. Brumley, J. M. Busby, F. S. Carpenter, Jr., K. Cayce, W. C. Cooley, C. W. Corbett, M. P. Crowther, H. M. De Laittre, J. D. Dennison, Jr., H. S. Gillette, W. P. Lillard, Jr., D. J. Lovell, J. J. McAnally, H. B. McCurdy, D. O. Maxwell, B. H. Mayer, W. H. Miller, H. B. Moore, J. S. Mulholland, Jr., F. S. Pohanka, Jr., T. F. Randolph, and A. B. Van Rennes.

The V-12's who studied Aeronautical or Marine Engineering and who have been sent to Cornell University, Ithaca, N.Y., for deck officer training are as follows: C. F. Ames, 3d, A. R. Atkinson, R. W. Ayling, D. Z. Bailey, A. R. Buccini, J. A. Conlin, F. E. Cotton, Jr., R. F. Cross, 3d, R. P. Dodds, H. B. Fabens, J. H. Frailey, A. B. Porson, R. Haddox, Jr., J. J. Healy, R. H. Hinchcliff, J. L. Hull, R. L. Hunter, J. T. Lester, Jr., T. M. Long, C. V. Lynch, Jr., F. W. Nolan, Jr., W. H. Noyes, E. W. Peakes, A. Plaut, Jr., E. Pyle, Jr., G. E. Quisenberry, Jr., G. C. Swensson, R. F. Wilkinson, and J. Woolston.

The V-12's in Civil Engineering were sent to Camp Endicott for Seabee officer training. They include the following men: R. G. Carlson, F. R. Farmer, B. A. Lamberton, R. E. Meyerhoff, B. W. Moore, and A. C. Reppucci.

Another group that was arbitrarily chosen for the Naval Reserve Pre-midshipmen School, Asbury Park, N.J., consists of these men: A. L. Bryant, G. A. Butter, Jr., A. T. Hunt, Jr., R. C. Kennedy, J. W. Matthews, L. W. McKee, G. Y. Murray, D. S. Prosser, Jr., J. D. Reeves, R. J. Skilton, C. L. Sollenberger, G. F. Walsh, Jr., and L. I. Zirin.

Recently the Navy issued a hurried call for Construction Battalion (Seabee) volunteers. Many answered but few were chosen. Frank Laurenzano, Jim Healy, and Frank Nolan were among the few qualified. Bruno De Paoli stopped in the other day to say that he has been assigned to the naval radio school in Washington, D.C., and Ted Hellmuth, to the naval radio school in Chicago. B. J. Duffy, an ensign, is now teaching ordnance here at Columbia Midshipmen's School. A. C. D. Smith is a rated radar man.

Back at the Institute, Bob Knodel is assisting Avery Ashdown '24 in the organic chemistry lab, and Dick Lopez is doing research for the mechanical engineering department. Several engagements have been announced: that of Elaine Burkhardt of Mount Vernon, N.Y., to Frank Sales Pohanka, Jr.; that of Louella Rowntree of Arlington, Mass., to J. V. Richard Kaufman; that of Roxa Emmons Lee of Bryn Mawr to Edmund Wallace Peakes; and that of Nina Galbreth of Toledo, Ohio, to Malcolm Page Crowther. — JAMES S. MULHOLLAND, JR., *General Secretary*, 1172 77th Street, Brooklyn, N.Y. RODERICK L. HARRIS, *Assistant Secretary*, 1 Winchester Street, Brookline 46, Mass.

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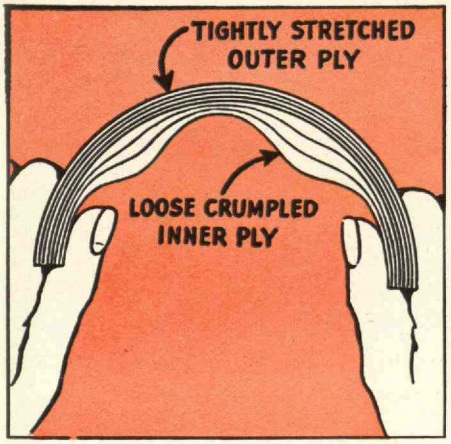

Try this yourself to illustrate what happens when your belts lack Compensation. A pad of paper, held firmly and bent has buckling sheets on the inside of the curve. This shows lack of equal tensions and illustrates why the plies of conventional belt "bootleg."

The Compensation Principle makes every ply work under equal stress—and prolongs the life of belts made from today's synthetic rubbers. You no longer need penalize your production by constant alternating of "stretch and buckle" stresses which, in ordinary belt, cause ply rupture as the belt goes round the pulley. Look at the diagram below which illustrates the difference between ordinary belt and Compensated Belt behavior under curve load. Note how Compensation—a patented and exclusive MANHATTAN development—*equalizes ply stresses*, prevents these destructive alternations of "stretch and buckle." Note how smoothly and uniformly the Compensated plies flex around the curve—providing fatigue relief for "war" rubber.

The amazing service you get is the result of MANHATTAN'S specially designed Strength Members so laid in FLEXLASTICS* that you get a truly Compensated Construction—flexible, longer-lived, with high overload capacity and capable of running over smaller pulleys without danger of ply separation or rupture of outside plies.

This principle of Compensation was developed for Condor Compensated Transmission Belt but is now also incorporated in MANHATTAN Conveyor Belts to increase service life where small end pulleys are used.

Users report 3 to 4 times longer fastener life. A paper mill reports a 9-year-old Compensated Belt "still performing like new." "100% more starting load capacity without appreciable belt slip," is still another comment.

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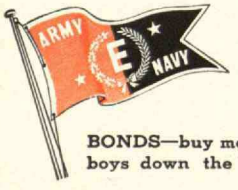
The term FLEXLASTICS is a MANHATTAN Trade Mark. Only MANHATTAN can make FLEXLASTICS.



BONDS—buy more to bring the boys down the home stretch.

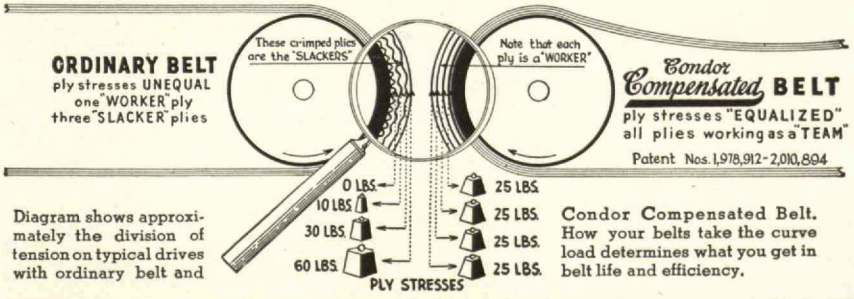


Diagram shows approximately the division of tension on typical drives with ordinary belt and Condor Compensated Belt. How your belts take the curve load determines what you get in belt life and efficiency.

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G-R is proud that it has been able to meet the urgent production requirements of the war effort. It is equally grateful that the substantial contributions from its Development and Engineering Departments, through many thousands of hours of consulting engineering on secret war projects, have directly assisted in the solution of technical problems of the greatest urgency.

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